UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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Fish Ecology Division
2725 Montlake Boulevard East
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August 24, 2005

MEMORANDUM FOR: F/PR - James H. Lecky

FROM: F/NWC3 - John W. Ferguson

SUBJECT: Revised Estimation of Percentages for Listed Pacific Salmon and Steelhead Smolts Arriving at Various Locations in the Columbia River Basin in 2005 Based on June 2005 Changes in Listing Status

When the new ESA listings regarding Chinook salmon hatcheries and Lower Columbia River ESU coho salmon became effective in June 2005, we were asked to update the April 19, 2005 version of this memorandum. This revision details the effects of the listing changes. The only species/runs from the previous memorandum that are affected are spring/summer and fall Chinook salmon. Steelhead and sockeye and chum salmon were not affected by the listing changes. Their inclusion in this revised memorandum is to maintain all species within one document for ease of creating annual reports. One additional species, coho salmon, has been added to this revised memorandum in response to the recent listing of Lower Columbia River ESU coho salmon.

We are providing this level of detail so that Protected Resources Division (F/PR3) staff can better understand how these percentages were derived. Feel free to discuss this memorandum with all interested parties.

Attachments

cc: F/NWR3 - Griffin
F/NWR3 - Schaeffer
F/NWR5 - Ruff
F/PR3 - Jackson
F/NWC1 - Ford
F/NWC2 - Dickhoff
F/NWC3 - Casillas
F/NWC3 - Dey
F/NWC3 - Matthews
F/NWC3 - Gores
F/NWC3 - Ruehle
F/NWC3 - Williams
F/NWC4 - Clarke
F/NWC5 - Collier

YEARLING CHINOOK SALMON ESTIMATES

Snake River ESU

The estimate of wild spring/summer Chinook salmon arriving at Lower Granite Dam is based on Idaho Department of Fish and Game and Oregon Department of Fish and Wildlife redd counts for brood year 2003. Redd counts were grouped by drainages where fecundity rates were available (Middle Fork of the Salmon River, South Fork of the Salmon River, Salmon River (excluding Middle and South Forks), Clearwater River, Imnaha River, and Grande Ronde River). The egg-to-smolt survival rate (to Lower Granite Dam) was set at 10%. We estimate that 2,813,811 wild/natural spring/summer Chinook salmon will reach Lower Granite Dam in 2005.

Under the 2005 listing guidelines, hatchery fish must now be tracked, not only by their listing status, but also by whether they have been adipose-fin clipped. We estimate that 10,738,707 hatchery spring/summer Chinook salmon smolts will be released from Idaho (9,745,730) and Oregon (992,977). Of these 10,738,707 hatchery spring/summer Chinook salmon smolts, 3,475,758 will be listed (3,131,390 with AD-clips and 344,368 without AD-clips) and 7,262,949 will be unlisted (7,187,949 with AD-clips and 75,000 without AD-clips).

In order to estimate how many hatchery smolts will reach Lower Granite Dam, we first estimated the percentage composition of Snake River spring/summer Chinook salmon arriving at the dam from listed hatcheries (Table 1). Using the mean survival estimates for the 1993-2004 outmigrations (excluding 2001, which was a record low flow year), we estimated the total number of hatchery fish that will arrive at Lower Granite Dam. The mean survival estimate for each hatchery from these 12 years was applied to the 2005 projected release numbers for each hatchery. We estimate that 6,786,829 or 63.19969% of the 10,738,707 hatchery fish released will arrive at Lower Granite Dam. Of these 6,786,829 hatchery spring/summer Chinook salmon smolts, 1,993,788 will be listed (1,817,899 with AD-clips and 175,889 without AD-clips) and 4,793,041 will be unlisted (4,747,666 with AD-clips and 45,375 without AD-clips).

One of the June 2005 changes was the listing of Snake River hatchery fall Chinook salmon under the ESA. While most hatchery fall Chinook salmon are released as subyearlings, the Nez Perce Tribe and Washington Department of Fish and Wildlife release yearling fall Chinook salmon above Lower Granite Dam. Because these fish may not be distinguishable from yearling spring/summer Chinook salmon, they have been included in the yearling estimates detailed below.

Holdover fall Chinook salmon (wild fish that do not outmigrate as subyearlings and hatchery fish released as subyearlings that did not outmigrate as subyearlings) show extreme year-to-year variability in the numbers collected at the various dams. Also, based on PIT-tag detections of holdover fall Chinook salmon, it is known that these fish can stop migrating anywhere along their migration route and holdover to the next spring. These two characteristics of fall Chinook life history make it extremely difficult to estimate how many holdover fish will outmigrate in any given year. Therefore, no estimates of holdover yearling fall Chinook salmon are included.

In 2005, 290,215 yearling listed hatchery AD-clipped fall Chinook salmon were released above Lower Granite Dam. Using an average survival rate of 0.895 (Steve Rocklage, Nez Perce Tribe, pers. comm., 2005), we estimate that 259,742 yearling listed hatchery AD-clipped fall Chinook salmon will arrive at Lower Granite Dam.

Knowing the total number of hatchery fish, the number of listed hatchery fish, and the number of wild fish arriving at Lower Granite Dam, we estimated the percentage composition of listed hatchery fish and wild fish arriving at the dam.

total yearling smolts = total hatchery fish + wild fish =
9,860,382 = (6,786,829 + 259,742) + 2,813,811

% wild fish to dam = wild fish/total smolts =
28.53653% = 2,813,811/9,860,382

% listed hatchery fish = listed hatchery fish/total smolts =

AD-clip spring/summer	18.43639% = 1,817,899/9,860,382
Non-AD-clip spring/summer	1.78379% = 175,889/9,860,382
AD-clip yearling fall	2.63420% = 259,742/9,860,382

We set fish guidance efficiencies (FGE) at Lower Granite and Little Goose Dams to 0.418 and 0.458, respectively. Using an FGE of 0.418, the total collection at Lower Granite Dam will be 4,121,640 (9,860,382 x 0.418), based on 9,860,382 smolts arriving at the dam. The collection at Lower Granite Dam will be comprised of

Listed wild spring/summer	1,176,173
Listed AD-clip hatchery spring/summer	759,882
Listed Non-AD-clip hatchery spring/summer	73,521
Listed AD-clip hatchery yearling fall	108,572
Unlisted AD-clip hatchery spring/summer	1,984,519
Unlisted Non-AD-clip hatchery spring/summer	18,973

Tucannon River fish, both hatchery and wild, are within the Snake River spring/summer Chinook salmon Evolutionarily Significant Unit (ESU) and are considered listed fish. In spring 2005, 30,000 wild and 201,218 non-AD-clipped hatchery spring/summer Chinook salmon were expected to outmigrate from the Tucannon River. The Tucannon River joins the Snake River between Little Goose and Lower Monumental Dams. Because of the short distance from the confluence to Lower Monumental Dam, we assumed no mortality of these fish prior to Lower Monumental Dam. The estimates shown in Table 2 and Tables 7-8 reflect the addition of these fish above Lower Monumental Dam.

Since 1995, some of the PIT-tagged fish bypassed at the collection dams (Lower Granite, Little Goose, Lower Monumental, and McNary Dams) have been returned to the river to continue migrating inriver. This return of fish to the river requires adjustment of our estimates of the number of listed fish that reach McNary Dam. We estimated the number of fish that will be PIT-tagged for 2005 and, as described in Appendix A, adjusted for fish diverted to transportation at each Snake River collector dam. If transportation occurs at McNary Dam, we also assumed that 100% of all PIT-tagged fish would be returned to the river. A detailed description of how we estimated the impact of returning PIT-tagged fish to the river is presented in Appendix A. We estimated that 62,962 PIT-tagged spring/summer Chinook salmon from the Snake River (including 13,706 wild and 12,224 listed hatchery fish) will be collected at McNary Dam because they were returned to the river at an upstream dam(s). These numbers represent collected fish. Dividing the collected number by the FGE at McNary Dam (0.384), we determined that 35,693 wild (13,706/0.384) and 31,833 listed hatchery (12,224/0.384) fish will arrive at McNary Dam and must be added to the number of fish that were estimated to reach McNary Dam as a result of not having been collected at an upstream dam (column "Listed fish to McNary", Table 2).

Upper Columbia River ESU

The Upper Columbia River ESU spring Chinook salmon is listed as endangered under the ESA. The ESU begins at the confluence of the Yakima and Columbia Rivers and continues upstream to Chief Joseph Dam.

Adults that returned in 2003 produced the smolts that will outmigrate in 2005. We obtained 2003 redd counts for the major Columbia River tributaries in this ESU from Washington Department of Fish and Wildlife (WDFW) and the Yakama Indian Nation. Fecundity estimates for this ESU range from 4,000 to 5,500 eggs per female. Estimates for egg-to-smolt survival generally range

up to 19%. Using the median egg count, 4,750, and a conservative egg-to-smolt survival estimate (to the first dam encountered) of 15%, we estimated the number of smolts that each stream will produce.

We also have hatchery release estimates for this ESU from WDFW and the U.S. Fish and Wildlife Service. There are no survival estimates for these hatcheries. So, based on the distance from the hatchery to the first dam the fish will encounter, we assigned the same survival estimates for Snake River hatcheries, with similar distances to the first dam. Using this method, we assigned a survival rate of 0.778 (Dworshak Hatchery's survival estimate to Lower Granite Dam) to the fish from Winthrop, Methow, Entiat, and Leavenworth Hatcheries, a survival estimate of 0.645 (Rapid River Hatchery's estimate to Lower Granite Dam) to Cle Elum Hatchery, and a survival estimate of 100% to Eastbank and Ringold Hatcheries.

Because we have no per-project survival information for spring Chinook salmon in the Columbia River above McNary Dam, we assigned the same per-project estimate (0.9) used on the Snake and lower Columbia Rivers. Survival estimates derived from a 1 year study using yearling hatchery fall Chinook salmon support using this estimate (M. Brad Eppard, NMFS, Pers. commun., January 1999).

In 2005, over 2,000,000 hatchery yearling summer Chinook salmon (all AD-clipped) were released in the Columbia River above McNary Dam. There are no listed summer Chinook salmon in the Columbia River. Because these fish may not be distinguishable from yearling spring/summer Chinook salmon, they have been included in the yearling estimates detailed below. For the same reasons discussed under the Snake River section above, we were unable to estimate the number of holdover summer Chinook salmon outmigrating through the Columbia River.

Based on the assumptions stated above, we derived the estimates shown in Table 7. Based on projected hatchery releases and the number of wild smolts we estimate will outmigrate from the various drainages along the Columbia River above McNary Dam, we estimate that 5,778,527 spring Chinook salmon will arrive at McNary Dam. The composition of fish arriving at McNary Dam will be

Listed wild spring	530,498
Listed AD-clip hatchery spring	237,853
Listed Non-AD-clip hatchery spring	325,333
Unlisted wild spring	1,300,313
Unlisted AD-clip hatchery spring	2,301,554
Unlisted Non-AD-clip hatchery spring	29,274
Unlisted AD-clip hatchery yearling summer	1,053,701

Note that the numbers shown for Columbia River dams above McNary Dam are numbers arriving at the dam and not the numbers collected at the dam. The reason for this is that fish guidance efficiency (FGE) for these dams is either unknown or is currently being evaluated.

Estimate of Fish Arriving at McNary Dam

McNary Dam is the first dam on the Columbia River below the confluence of the Snake River. To obtain an estimate of the number of spring/summer Chinook salmon smolts arriving at McNary Dam, we added the estimated numbers from the Columbia River above McNary Dam (5,778,527) and the Snake River (1,840,412).

We estimate that 7,618,939 (5,778,527 + 1,840,412) spring/summer Chinook salmon smolts will arrive at McNary Dam in 2005, and that 2,925,673 fish will be collected (FGE = 0.384). The collection at McNary Dam will be comprised of

	Snake R. ESU	Upper Col. R. ESU	Total	Percent
Listed groups				
Wild spring/summer	164,195	203,711	367,906	12.6
AD-clip hatchery spring/summer	108,042	91,336	199,378	6.8
Non-AD-clip hatchery spring/summer	49,461	124,928	174,389	6.0
AD-clip hatchery yearling fall	58,866	0	58,866	2.0
Non-AD-clip hatchery yearling fall	45,531	0	45,531	1.6
Unlisted groups				
Wild spring	0	499,320	499,320	17.1
AD-clip hatchery spring/summer	278,292	883,797	1,162,089	39.7
Non-AD-clip hatchery spring/summer	2,330	11,241	13,571	0.5
AD-clip hatchery yearling Col. R. summer	0	404,621	404,621	13.8

The ratio of Upper Columbia River ESU wild spring Chinook salmon to Snake River ESU wild spring/summer Chinook salmon at McNary, John Day, and The Dalles Dams will be 55.4%:44.6% (326,787:263,397). The ratio of Upper Columbia River ESU listed hatchery fish to Snake River ESU listed hatchery fish at McNary, John Day, The Dalles, and Bonneville Dams will be

	Ad-clipped	Non-AD-clipped
Snake R spring/summers	41.8 (173,317)	22.5 (79,344)
Snake R yearling falls	22.8 (94,432)	20.7 (73,040)
Upper Columbia R springs	35.4 (146,517)	56.8 (200,405)

We received some redd information from Oregon Department of Fish and Wildlife (ODFW) for the John Day River and, using the same redd to smolt calculation as described above (Upper Columbia River ESU, paragraph 2), we added 815,100 wild unlisted fish between McNary and John Day Dams. We did not receive any 2003 redd count data for the Deschutes River, so we estimated the number of redds by multiplying the 2001 redd count by the change between the 2001 and 2003 redd counts from the John Day River. This resulted in 490,200 wild unlisted fish being added between John Day and The Dalles Dams. However, because none of these fish are listed, there will be no effect on the ratios of Upper Columbia River ESU and Snake River ESU listed fish.

Lower Columbia River ESU

The Lower Columbia River ESU extends from the mouth of the Columbia River to the crest of the Cascade Range, excluding populations above Willamette Falls. This ESU includes wild and hatchery spring-run and fall-run Chinook salmon. The fall-run fish will be discussed below under the subyearling fall Chinook salmon section. We have no information on spawning above Bonneville Dam for this ESU. This ESU will introduce 1,152,358 wild and 2,407,555 hatchery (2,257,555 AD-clipped and 150,000 non-AD-clipped) spring Chinook salmon to the Columbia River below Bonneville Dam.

Estimate of Fish Arriving at Bonneville Dam

At Bonneville Dam, the ratio of Upper Columbia River ESU and Snake River ESU listed wild fish (there is no information on Lower Columbia River ESU spawning above Bonneville Dam) will be 55.4%:44.6% (238,227:192,016)

Fish transported from Snake River dams and McNary Dam are released below Bonneville Dam. The number of listed transport fish by ESU returned to the river will be 4,852,083. The composition of these fish will be

Snake River ESU (Total number = 4,446,436)	
Listed wild spring/summers	2,274,415
Listed AD-clip hatchery spring/summers	1,460,497
Listed Non-AD-clip hatchery spring/summers	252,317
Listed AD-clip hatchery yearling falls	333,460
Listed Non-AD-clip hatchery yearling falls	125,747
Upper Columbia River ESU (Total number = 405,647)	
Listed wild springs	196,122
Listed AD-clip hatchery springs	84,597
Listed Non-AD-clip hatchery springs	124,928

A total of 10,484,018 (4,852,083 listed + 5,631,935 unlisted fish) transported yearling Chinook salmon will be released below Bonneville Dam.

Upper Willamette River ESU

The Upper Willamette River ESU contains spring Chinook salmon populations above Willamette Falls. This ESU will introduce 8,166,126 listed wild and 3,681,164 listed hatchery (all AD-clipped) spring Chinook salmon to the Columbia River below Bonneville Dam.

The ratio of Upper Columbia River ESU, Snake River ESU, Lower Columbia River ESU, and Upper Willamette River ESU listed wild fish at Tongue Point will be 3.6%:20.2%:9.4%:66.8% (434,349:2,466,431:1,152,358:8,166,126). The ratio of Upper Columbia River ESU, Snake River ESU, Lower Columbia River ESU, and Upper Willamette River ESU listed hatchery fish at Tongue Point will be

	Ad-clipped	Non-AD-clipped
Upper Columbia R spring	2.4 (191,408)	29.8 (271,024)
Snake R spring/summer	19.5 (1,586,845)	34.1 (310,159)
Lower Columbia R spring	27.8 (2,257,555)	16.5 (150,000)
Upper Willamette R spring	45.3 (3,681,164)	0 (0)
Snake R yearling fall	5.0 (402,301)	19.7 (178,993)

The per-project survival estimate remained the same (0.9) (Table 2).

Summary

Tables 7a, 7b, and 8 present a summary of the estimated number of fish that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the dams during 2005. This information is derived from the data shown in Tables 1-2 and Appendix Table A1. Table 11 shows the estimated number of listed spring, spring/summer, and yearling fall Chinook salmon expected to outmigrate from each ESU.

COHO SALMON ESTIMATES

Lower Columbia River coho salmon were listed under the Endangered Species Act in June 2005. The Lower Columbia River ESU extends from the mouth of the Columbia River to the Big White Salmon River on the Washington State shore and the Hood River on the Oregon shore. It includes the Willamette River to Willamette Falls, Oregon. This ESU includes both wild and hatchery-origin coho salmon.

Hatchery coho salmon are released in the Snake River and the Columbia River above the Lower Columbia River ESU. At this time we have no estimates of wild coho salmon from these areas; therefore, we have included no wild information in Table 7. As with yearling and subyearling Chinook salmon, hatchery fish must be tracked based on whether they have an adipose-fin clip.

We assigned coho salmon the same survival rates and FGEs as yearling Chinook salmon in all our calculations. Also, as with the other species discussed here, all our calculations are based on the "Transportation with Spill" scenario.

Based on hatchery outplanting records, we estimate that 816,300 hatchery coho salmon (100,000 AD-clipped and 716,300 non-AD-clipped) were released into the Snake River drainage. We estimate that 11,245,131 hatchery coho salmon (6,913,479 AD-clipped and 4,331,652 non-AD-clipped) were released into the Columbia River drainage above the Lower Columbia River ESU. From these releases, we estimate that 8,799,834 hatchery coho salmon (4,056,543 AD-clipped and 4,743,291 non-AD-clipped) will reach Tongue Point.

Lower Columbia River ESU

We obtained wild and hatchery coho salmon production estimates for 2005 from the various agencies involved in the lower Columbia River system. From the information provided, we estimate that 94,114 listed wild coho salmon will arrive at Bonneville Dam. No listed hatchery fish are released above Bonneville Dam.

Listed wild coho salmon estimates from below Bonneville Dam to Tongue Point are 1,105,190, while hatchery releases in this area were 15,951,000 (all listed AD-clipped fish).

In addition, another 5,850 listed wild and 1,289,900 hatchery (1,282,500 AD-clipped and 7,400 non-AD-clipped, all listed) coho salmon will enter the Columbia River below Tongue Point.

Summary

Table 7c presents a summary of the estimated number of fish that will be collected, or will be arriving, at various locations during 2005. Table 11 shows the estimated number of listed coho salmon expected to outmigrate from the Lower Columbia River ESU.

SUBYEARLING FALL CHINOOK SALMON ESTIMATES

To estimate the 2005 collection number at Lower Granite Dam, we used the 2004 collection number and the adult returns over the dam for 2003 and 2004. In 2004, 1,530,000 unmarked hatchery subyearling fall Chinook salmon were released above Lower Granite Dam. Assuming a survival rate of 0.676 (the estimated survival rate of hatchery subyearling fall Chinook salmon released above Lower Granite Dam in 2004), 1,034,790 (1,530,000 x 0.676) of these fish would have arrived at Lower Granite Dam. Assuming an FGE of 0.654 (derived from PIT-tagged hatchery subyearling fall Chinook salmon in 2004), 676,753 (1,034,790 x 0.654) would have been collected at Lower Granite Dam. Through December 31, 2004 960,323 unclipped (and without a coded-wire tag) subyearling Chinook salmon had been collected at Lower Granite Dam. By removing the estimated 676,753 unmarked hatchery subyearling fall Chinook salmon, we estimate that 283,570 (960,323 - 676,753) wild subyearling fall Chinook salmon were collected at Lower Granite Dam in 2004. These wild subyearling fall Chinook salmon were from the 2003 adult return. The adult count over Lower Granite Dam in 2003 was 11,732. Of these, 776 were hatchery fish that were returned to Lyons Ferry Hatchery and 10,956 adults were passed above Lower Granite Dam. The 2005 outmigration will be the result of the 2004 adults passed over Lower Granite Dam. Through December 31, 2004, 14,960 adults had been counted in the adult ladder. Of these, 2,487 fish were returned to Lyons Ferry Hatchery, leaving 12,473 adults that were passed above Lower Granite Dam. The 2004 count of 12,473 adults represents a 113.8% increase over the 2003 count (10,956). We applied this increase (113.8%) to the 2004 subyearling collection number to arrive at the estimated 2005 collection number.

(total wild fall Chinook collected at Granite) = (wild fall Chinook collected in 2004) x (% change between adult counts for 2004 and 2005 outmigrations) =

322,703 = 283,570 x 1.138

We estimated the total number of wild subyearling fall Chinook salmon arriving at Lower Granite Dam by dividing the number of wild fish collected by the FGE at Lower Granite Dam. The average estimated FGE for PIT-tagged hatchery subyearling fall Chinook salmon arriving at Lower Granite Dam from 1995-2004 (excluding 2001) is 0.542.

total wild fall Chinook = total wild fall Chinook collected/FGE =
595,393 = 322,703/0.542

The Nez Perce Tribe along with WDFW released 3,964,117 listed subyearling fall Chinook salmon in the Clearwater and Snake Rivers in 2005. Of these fish, 1,794,014 were AD-clipped and 2,170,103 were non-AD-clipped. Assuming a survival rate of 0.404 (the average estimated survival rate of PIT-tagged hatchery subyearling fall Chinook salmon released above Lower Granite Dam from 1995-2004 (excluding 2001)), 1,601,504 (3,964,117 x 0.404) of the 3,964,117 hatchery fish will arrive at Lower Granite Dam. Of these fish, 724,782 AD-clipped and 876,722 non-AD-clipped. In 2005, NMFS and the U.S. Fish and Wildlife Service conducted research using 179,000 hatchery subyearling fall Chinook salmon (all non-AD-clipped). Based on survival to Lower Granite Dam (0.404), 72,316 (179,000 x 0.404) will arrive at Lower Granite Dam. Combining the production and research non-AD-clipped fish, the total number of non-AD-clipped hatchery fish will be 949,038 (876,722 + 72,316). By adding the non-AD-clipped fish to the total number of wild fall Chinook salmon (595,393), we estimate that 1,544,431 non-AD-clipped subyearling fall Chinook salmon will arrive at Lower Granite Dam. The percentage of non-AD-clipped subyearling fall Chinook salmon that are wild will be 38.55% (595,393/1,544,431). We added the total AD-clipped hatchery fish (724,782), the total non-AD-clipped hatchery fish (949,038), and the total wild fish (595,393) to determine the total number of subyearling fall Chinook salmon arriving at Lower Granite Dam (2,269,213).

Knowing the total number of hatchery fish, the number of listed hatchery fish, and the number of wild fish arriving at Lower Granite Dam, we estimated the percentage composition of listed hatchery fish and wild fish arriving at the dam.

% listed fish = listed fish/total smolts =

Wild subyearling fall	26.2379% = 595,393/2,269,213
AD-clip subyearling fall	31.9398% = 724,782/2,269,213
Non-AD-clip subyearling fall	41.8223% = 949,038/2,269,213

We set fish guidance efficiencies (FGE) at Lower Granite and Little Goose Dams to 0.542 and 0.513, respectively. Using an FGE of 0.542, the total collection at Lower Granite Dam will be 1,229,913 (2,269,213 x 0.542), based on 2,269,213 smolts arriving at the dam. The collection at Lower Granite Dam will be comprised of

Listed wild subyearling fall	322,703
Listed AD-clip hatchery subyearling fall	392,832
Listed Non-AD-clip hatchery subyearling fall	514,378

NMFS has conducted subyearling fall Chinook salmon survival tests since 1995. As part of these tests, we estimated actual FGE's for McNary Dam (factoring in effects of spill). To more

accurately estimate the collection number at McNary Dam, we averaged these actual FGE's for 1995-2004 (excluding 2001). We also averaged the number of fall Chinook salmon adults crossing McNary Dam for each of the brood years (1994-2003) and the number of juvenile subyearling fall Chinook salmon collected at McNary Dam (1995-2004). The 2004 count of 170,648 adults represents 182.2% of the average for 1994-2003 count (93,646). We applied this change (182.2%) to the average 1995-2003 subyearling collection number (6,754,101) to arrive at an estimated 2005 collection number of 12,305,972 (6,754,101 x 1.822).

Based on the NMFS subyearling fall Chinook salmon survival studies conducted in 1995-2004 (excluding 2001), per-project survival was set at 75%. We set the FGEs at Little Goose, Lower Monumental, and McNary Dams, based on 1995-2004 (excluding 2001) NMFS fall Chinook salmon survival study results, to 0.513, 0.459, and 0.509, respectively.

Lower Columbia River ESU

The Lower Columbia River ESU includes both wild and hatchery tule and late-run bright fall Chinook salmon.

To determine the number of wild outmigrants from this ESU, we assumed that 50% of the adults counted in the spawning areas were female and that every female spawned successfully. We used average fecundity and set the egg-to-smolt survival rate at 15%, the same used for spring/summer Chinook salmon.

Based on these assumptions, we estimate that 394,528 tule fall Chinook salmon will outmigrate from above Bonneville Dam. No late-run bright fish will enter the Columbia River above Bonneville Dam. Additionally, we estimate that 8,177,741 tule fall Chinook salmon and 4,009,111 late-run bright fall Chinook salmon will enter the Columbia River below Bonneville Dam.

The ratio of Snake River ESU and Lower Columbia River ESU (tule fall Chinook salmon) listed wild fish at Bonneville Dam will be 1.7%:98.4% (6,600:394,528).

With the June 2005 change in ESA listing status, most hatchery fish released in this ESU are now listed. In 2005, hatchery releases above Bonneville Dam totaled 18,623,488 listed tule (14,833,488 AD-clipped and 3,790,000 non-AD-clipped) and 1,902,863 unlisted (all AD-clipped) subyearling fall Chinook salmon. Below Bonneville Dam releases totaled 21,992,675 listed tule (667,500 AD-clipped and 21,325,175 non-AD-clipped) and 6,627,661 unlisted (226,000 AD-clipped and 6,401,661 non-AD-clipped) subyearling fall Chinook salmon.

The ratio of Snake River ESU and Lower Columbia River ESU (tule fall Chinook salmon) listed hatchery AD-clipped fish at Bonneville Dam will be 0.1%:99.9% (18,350:14,833,488), while the ratio for hatchery non-AD-clipped fish at Bonneville Dam will be 0.2%:99.8% (6,934:3,790,000).

Fish transported from Snake River dams and McNary Dam are released below Bonneville Dam. The number of listed transport fish returned to the river will be 491,894 wild, 699,258 AD-clipped, and 753,304 non-AD-clipped fish, all from the Snake River ESU. A total of 14,115,979 transported subyearling fall Chinook salmon will be released below Bonneville Dam.

The ratio of Snake River ESU, Lower Columbia River ESU (tule fall Chinook salmon), and Lower Columbia River ESU (late-run bright fall Chinook salmon) listed wild fish at Tongue Point will be 3.8%:65.5%:30.7% (498,494:8,572,269:4,009,111). The ratio for hatchery fish at Tongue Point will be

	Ad-clipped		Non-AD-clipped	
Snake R. subyearling fall	4.4	(717,608)	2.7	(704,135)
Lower Columbia R. subyearling fall - Tule	95.6	(15,500,988)	97.3	(25,115,175)
Lower Columbia R. subyearling fall - Late run	0.0	(0)	0.0	(0)

Summary

Tables 7a and 7b present a summary of the estimated number of fish that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the dams during 2005. This information is derived from the data shown in Table 2. Table 11 shows the estimated number of subyearling fall Chinook salmon expected to outmigrate from each ESU.

SOCKEYE SALMON ESTIMATES

The sockeye salmon collection count at Lower Granite Dam was based on IDFG's estimate of wild and hatchery-reared sockeye salmon smolts exiting the upper Salmon River in 2005 and their estimates of survival to Lower Granite Dam. IDFG estimates that 5,567 wild fish and 21,517 hatchery fish that have overwintered in the lakes will survive to Lower Granite Dam in spring 2005. All of these fish are listed as endangered.

listed sockeye (wild and hatchery) to Lower Granite Dam =
IDFG's estimated wild fish + estimated hatchery fish =
27,084 = 5,567 + 21,517

To determine the percentage of wild sockeye salmon collected at Lower Granite Dam, we estimated the number of kokanee arriving at Lower Granite Dam. In 2004, we estimated that 710 wild Redfish Lake sockeye salmon would be collected at Lower Granite Dam. During that outmigration, spill from Dworshak Dam released kokanee that were collected at Lower Granite Dam. The total collection of wild *Oncorhynchus nerka* salmon at Lower Granite Dam for 2004 (through December 31, 2004) was 2,746, 2,036 of which (2,746 - 710) were kokanee. With an FGE of 0.710 (the 2004 estimate), 2,868 (2,036/0.710) kokanee reached Lower Granite Dam. Assuming the same amount of spill from Dworshak Dam in 2005 with a release of the same number of kokanee, we estimated the total number of wild *O. nerka* arriving at Lower Granite Dam to be 8,435 (2,868 + 5,567). We then estimated the percentage of wild *O. nerka* arriving at Lower Granite Dam that will be listed Snake River sockeye salmon.

% listed wild sockeye =
listed wild sockeye/total wild *O. nerka* to Lower Granite Dam =
66.0% = 5,567/8,435

A total of 29,952 (27,084 listed sockeye + 2,868 kokanee) *O. nerka* will arrive at Lower Granite Dam.

% total listed sockeye =
total listed sockeye/total *O. nerka* to Lower Granite Dam =
90.4% = 27,084/29,952

An FGE of 0.351 (average for 1998-2004 (excluding 2001)) was used to estimate the number of *O. nerka* smolts reaching Lower Granite Dam that will be collected.

O. nerka salmon collected = total *O. nerka* salmon x FGE =
10,513 = 29,952 x 0.351

Because of extreme year-to-year variability, the count used at McNary Dam for 2005 is based on the average of the counts at the

dam from 1985 to 2004 (560,730). Project survival was set at the yearling Chinook salmon level (Table 2).

Summary

Table 7 presents a summary of the estimated number of fish that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the dams during 2005. This information is derived from the data shown in Table 2. Table 11 shows the estimated number of sockeye salmon expected to outmigrate from the Snake River ESU.

STEELHEAD ESTIMATES

Introduction

Because of the time of year that steelhead spawn, it is very difficult to obtain redd count information. All of our steelhead estimates, not otherwise explained, are based on adult counts in the spawning areas. We assumed that 65% of the adults were females and that every female spawned successfully. To estimate the number of outmigrants, we used average fecundity estimates, and assigned an egg-to-smolt survival rate of 1%. This survival rate is conservative as all rates we calculated or found in the literature were from 0.5% to 0.75%.

Snake River Steelhead ESU

Prior to the 2001 outmigration, nearly all hatchery steelhead were fin-clipped, allowing us to use the juvenile collection numbers at Lower Granite Dam without making any adjustments for unclipped hatchery fish. Because it was known that a large number of unclipped steelhead were to be released for the 2004 outmigration, WDFW not only recorded the number of unclipped steelhead collected but also the number of unclipped steelhead that had fin erosion, a strong indicator that a fish is of hatchery origin. Based on the information provided by WDFW (Fred Mensik, WDFW, Pers. commun., January 2005), we determined that 552,869 wild steelhead were collected at Lower Granite Dam in 2004 (0.493, or 537,445, of the 1,090,314 unclipped steelhead collected at Lower Granite Dam in 2004 had fin erosion). We applied the 2004 estimated FGE (0.775) to the collection number to determine that 713,379 (552,869/0.775) wild steelhead arrived at Lower Granite Dam in 2004.

To our knowledge, no research has been conducted on the age-class distribution of migrating juvenile steelhead in the Snake River; however, there has been research on the mid-Columbia River (Pevan et al. 1994[1]). Pevan's research showed that in the mid-Columbia River, migrating steelhead were 0.7% age-1, 43.2% age-2, 46.4% age-3, and 8.6% age-4 smolts. The age-class of the remainder of smolts (1.1%) was greater than age-4, up to age-7. Because of this age-class breakdown, we decided to base our estimates on age-classes 1 to 4. Because steelhead spawn in the spring, our annual counts were from July 1 to June 30, rather than by calendar year. Using the adult counts at Lower Granite Dam of the 4 years that comprised the 2004 wild smolt outmigration (2000-2003 brood years, July 1, 1999-June 30, 2003), and applying

[1] Pevan, C. M., R. R. Whitney, and K. R. Williams. 1994. Age and length of steelhead smolts from the Mid-Columbia River Basin, Washington. N. Am. J. Fish. Manage. 14:77-86.

the smolt age-class percentages to the adult counts for each of these 4 years, we estimated that 33,072 of the adults passing Lower Granite Dam produced the 2004 steelhead outmigration. We performed the same calculation to estimate the number of adults from the 4 years (2001-2004 brood years) producing the 2005 wild outmigration. We calculated that the 2005 wild outmigration will be based on 50,217 adults, or 151.8% of the number of fish producing the 2004 outmigration. We applied the change in the number of adults to the number of wild steelhead that arrived at Lower Granite Dam in 2004 (713,379) to determine the estimated 2005 arrival number.

(total wild steelhead arriving at Lower Granite) = (wild steelhead arriving in 2004) x (% change between adult counts for 2004 and 2005 outmigrations) =

1,082,909 = 713,379 x 1.518

For the steelhead hatchery release numbers, we used IDFG's, ODFW's, and WDFW's estimates of hatchery releases in Idaho, Oregon, and Washington. We estimate that 9,073,500 hatchery smolts (Table 4) will be released from Idaho (7,676,500), Oregon (1,057,000), and Washington (340,000 in the Grande Ronde River). In the Snake River above Lower Granite Dam, no hatchery steelhead are listed under the ESA.

In order to estimate how many hatchery smolts will reach Lower Granite Dam, we attempted to use the survival estimates for the 1993-2004 outmigrations (excluding 2001) (from the NMFS survival study, Research Action #1212). Survival estimates have been made for all but two hatchery release groups, releases into the Grande Ronde Basin from Irrigon and Lyons Ferry Hatcheries. We applied the survival estimate from Dworshak National Fish Hatchery (0.799) to these hatchery release groups. Using the 2005 projected release number and survival estimate for each hatchery, we estimated how many total hatchery fish will arrive at Lower Granite Dam. We estimate that 6,948,857 or 78.1341% of the 9,073,500 hatchery fish released will arrive at the dam (Table 4).

Knowing the numbers of hatchery and wild fish arriving at Lower Granite Dam, we estimated the percentage composition of listed wild fish arriving at the dam.

total smolts = total hatchery fish + wild fish =
8,031,766 = 6,948,857 + 1,082,909

% wild fish to Lower Granite Dam = wild fish/total smolts =
13.48283% = 1,082,909/8,031,766

We set FGEs at Lower Granite and Little Goose Dams at 0.469 and 0.518, respectively. Using an FGE of 0.469, the total collection at Lower Granite Dam will be 3,766,898 (8,031,766 x 0.469), based on 8,031,766 smolts arriving at the dam. Wild and hatchery fish, will comprise 507,884 (1,082,909 x 0.469) and 3,259,014 (3,766,898 - 507,884) of the total collection, respectively.

Wild/natural Tucannon River drainage fish are listed within the Snake River ESU. In spring 2005, 25,000 wild fish are expected to outmigrate from the Tucannon River. In addition, 220,000 non-listed hatchery fish will be released into the Tucannon River or released directly from Lyons Ferry Hatchery. The Tucannon River joins the Snake River between Little Goose and Lower Monumental Dams. Because of the short distance from the confluence to Lower Monumental Dam, we assumed no mortality of these fish prior to Lower Monumental Dam. The estimates shown in Table 5 and Tables 9-10 reflect the addition of these fish above Lower Monumental Dam.

WDFW will release 137,000 non-listed hatchery steelhead into the Touchet River, a tributary of the Walla Walla River, and 100,000 non-listed hatchery steelhead (from Mid-Columbia River ESU stock) into the Walla Walla River. The Walla Walla River enters the Columbia River above McNary Dam. For these fish, survival to McNary Dam was set at 100%.

Except when research studies require an alternate disposition, all PIT-tagged fish bypassed at the collection dams (Lower Granite, Little Goose, Lower Monumental, and McNary Dams) are returned to the river to continue migrating inriver. This return of fish to the river requires adjustment of our estimates of the number of listed fish that reach McNary Dam. We estimated the number of fish that will be PIT tagged for 2005 and, as described in Appendix B, adjusted for fish diverted to transportation at each Snake River collector dam. A detailed description of how we estimated the impact of returning PIT-tagged fish to the river is presented in Appendix B. We estimated that 5,328 PIT-tagged steelhead from the Snake River (including 576 wild fish) will be collected at McNary Dam because they were returned to the river at an upstream dam(s). These numbers represent collected fish. Dividing the collected number by the FGE at McNary Dam (0.196), we determined that 2,941 wild Snake River steelhead (576/0.196) will arrive at McNary Dam and must be added to the number of fish that were estimated to reach McNary Dam as a result of not having been collected at an upstream dam (column "Listed fish to McNary", Table 5).

Upper-Columbia River ESU Steelhead

Very little is known regarding wild steelhead in the Columbia River above the confluence with the Yakima River. Also, little is known regarding dam passage of smolts at the dams above McNary Dam. Because of this lack of information, the estimates of wild steelhead from the listed Upper Columbia River ESU are based on what little information is available and on broad generalizations based on this information. No FGE's have been established for the dams in this reach, so the numbers presented in this section of the memorandum (and in Tables 9 and 10) are the number of fish arriving at the dam, not collection numbers (unless otherwise noted in the text).

As mentioned above, Pevan et al. (1994) showed that migrating steelhead were 0.7% age-1, 43.2% age-2, 46.4% age-3, and 8.6% age-4 smolts. The age-class of the remainder of smolts (1.1%) was greater than age-4, up to age-7. Because of this age-class breakdown, we decided to base our estimates on age-classes 1 to 4.

We based our estimates of wild fish on counts collected at Rock Island Dam by the Fish Passage Center. During the 2004 outmigration, 5,285 wild steelhead smolts were counted in the Smolt Monitoring Program's sample. It is estimated that the sample represents 3-5% of the fish passing the dam. Using a 4% sample rate, we estimated that 132,125 wild steelhead passed Rock Island Dam in 2004.

We then examined the adult counts at Rock Island Dam. Because steelhead spawn in the spring, our annual counts were from July 1 to June 30, rather than by calendar year. Using the adult counts of the 4 years that comprised the 2004 wild smolt outmigration (2000-2003 brood years, July 1, 1999-June 30, 2003), and applying the smolt age-class percentages to the adult counts for each of these 4 years, we estimated that 17,850 of the adults passing Rock Island Dam produced the 2004 steelhead outmigration. We performed the same calculation to estimate the number of adults from the 4 years (2001-2004 brood years) producing the 2005 wild outmigration. We calculated that the 2005 wild outmigration will be based on 20,653 adults, or 1.157 of the number of fish producing the 2004 outmigration. We applied the change in the number of adults to the 2004 Rock Island Dam collection to arrive at the estimated 2005 collection number.

(total wild steelhead collected at Rock Island) = (wild steelhead collected in 2004) x (% change between adult counts for 2004 and 2005 outmigrations) =

6,115 = 5,285 x 1.157

Since this represents 4% of the fish passing the dam, we estimate that 152,875 wild steelhead smolts will pass the dam in 2005. Using the smolt age-class percentages, we estimate that 1,070 smolts will be age-1, 66,042 will be age-2, 70,934 will be age-3, and 13,147 will be age-4.

To determine the number of wild smolts passing the two dams above Rock Island Dam (Rocky Reach and Wells Dams), we used the estimate of wild smolts passing Rock Island Dam (152,875) and the adult counts at all three dams.

By comparing the adult counts at each of the three dams for the 4 years that will produce the 2005 outmigration (2001-2004), we calculated the number of adults "lost" between each dam. We assigned this "loss" to adults migrating up rivers between the dams. The difference in adult counts between dams varied between years, so we applied the age-class percentages to each year's differences between dams to determine the number of wild smolts added from the rivers between the dams.

From Rock Island Dam to McNary Dam, the only adjustment made to the wild steelhead smolt count was for per-project survival (0.9%).

To determine the number of hatchery smolts arriving at each dam in 2005, we used the outplanting data for the 3 years comprising the 2005 outmigration (2003-2005). Because hatchery fish are larger than equivalent age-class wild fish, we assigned age-2 status to hatchery fish released in 2005, age-3 to those released in 2004, and age-4 to those released in 2003. All of the hatchery outplants will be of listed hatchery stocks.

Because there are no survival data for the various hatcheries releasing fish in this section of the Columbia River, we assumed that all fish released survived to the first dam. We again applied the age-class percentages to the number of fish released each of the 3 years to determine the number of hatchery fish that would outmigrate in 2005. Beginning at Wells Dam and assuming 90% per-project survival, we determined both the number of listed hatchery and the total number of hatchery fish reaching each dam through McNary Dam (Tables 5 and 9).

Mid-Columbia River ESU Steelhead

The Mid-Columbia River wild summer-run and winter-run steelhead are listed protected species. There are no listed hatchery stocks in this ESU. Only summer steelhead from the Yakima and Walla Walla Rivers enter the Columbia River above McNary Dam. Because we received no new information on wild fish production from this ESU, this year’s wild estimates are the same as last year.

Based on our assumptions described in the steelhead introduction, 90,370 wild summer steelhead will enter above McNary Dam in 2005. An additional 228,114 wild and 155,000 unlisted hatchery summer steelhead from this ESU will be added between McNary and John Day Dams, and 65,160 wild and 160,000 unlisted hatchery summer steelhead will be added between John Day and The Dalles Dams.

Estimate of Fish Arriving at McNary Dam

McNary Dam is the first dam on the Columbia River below the confluence of the Snake River. To obtain an estimate of the number of steelhead smolts arriving at McNary Dam, we added the estimated numbers from the Upper Columbia River (820,832), Mid-Columbia (90,370) and the Snake River (1,090,374) ESUs.

We estimate that 2,001,576 (820,832 + 90,370 + 1,090,374) steelhead smolts will arrive at McNary Dam in 2005, and that 392,309 fish will be collected. Of the 392,309 smolts collected at McNary Dam, 61,285 (0.156) will be wild (21,843 Upper Columbia River ESU, 21,729 Snake River ESU, and 17,713 Mid-Columbia River ESU), 134,006 (0.342) will be listed hatchery (all from the Upper Columbia River ESU), and 197,018 (0.502) will be unlisted hatchery fish (5,033 Columbia River and 191,985 Snake River). The ratio of Upper Columbia River ESU wild fish, Snake River ESU wild fish and Mid-Columbia River ESU wild fish at McNary, John Day, and The Dalles Dams will be

	McNary Dam		John Day		The Dalles	
Upper Columbia	35.6	(21,843)	18.7	(80,643)	16.2	(72,579)
Snake River	35.5	(21,729)	18.6	(80,218)	16.2	(72,196)
Mid-Columbia						
Summer	28.9	(17,713)	62.7	(270,694)	67.6	(302,269)
winter		—		—		—

All listed hatchery fish are from the Upper Columbia River ESU.

Lower Columbia River ESU

We estimate that 47,074 wild steelhead from this ESU will arrive at Bonneville Dam. The effects of this are shown in the "Bonneville Dam" lines in Tables 9 and 10. The ratio of the various ESUs will be

	Bonneville Dam	
Upper Columbia	14.0	(65,321)
Snake River	13.9	(64,976)
Mid-Columbia		
summer	58.4	(272,042)
winter	3.6	(16,557)
Lower Columbia	10.1	(47,074)

Another 216,758 wild steelhead are expected to enter the Columbia River from Washington and Oregon downstream from Bonneville Dam to the Cowlitz River.

Fish transported from Snake River dams and McNary Dam are released below Bonneville Dam. The number of listed transport fish returned to the river will be 913,752 (913,752 wild), 155,644 (21,638 wild and 134,006 listed hatchery), and 17,546 (all wild) for the Snake River, Upper Columbia River, and Mid-Columbia River (summer-run) ESUs, respectively. A total of 7,032,262 transported steelhead will be released below Bonneville Dam.

Upper Willamette River ESU

The Upper Willamette River wild winter-run steelhead are listed protected species. There are no listed hatchery stocks in this ESU.

Based on our assumptions described in the steelhead introduction, 285,256 winter steelhead will enter the Columbia River in 2005, 216,784 of which will be from listed stocks.

At Tongue Point the ratios of the various ESUs will be

	Tongue Point	
Upper Columbia	4.7	(86,959)
Snake River	52.8	(978,728)
Mid-Columbia		
summer	15.6	(289,588)
winter	0.9	(16,557)
Lower Columbia	14.2	(263,832)
Upper Willamette	11.7	(216,784)

All listed hatchery fish are from the Upper Columbia River ESU.

Summary

Tables 9 and 10 summarize the estimated number of steelhead that will be collected, or will be arriving (Columbia River dams above McNary Dam), at each of the collection dams during 2005. This information is derived from the data shown in Tables 4-5 and Appendix Table B1. Table 11 shows the estimated number of steelhead expected to outmigrate from each ESU.

CHUM ESTIMATES

Columbia River ESU

Wild and hatchery chum salmon in the Columbia River are listed protected species.

The chum salmon adult count at Bonneville Dam in 2004 (47) was the lowest of the past 4 years. Preliminary data indicate that chum salmon numbers at Ives Island were 36% of those seen in 2003. Most other sites are not shown in state and federal reports (only 7 of the 28 sites reported last year). Because of the lack of data, we cannot make an estimate of listed chum salmon. We expect the hatchery (all non-AD-clipped) chum salmon outmigration to be 100,000 from the Columbia River, 100,000 from Chinook River, and 250,000 from Grays River.

Full Transportation Scenario

The estimates shown in Table 3 were derived using the same methodology utilized under the Transportation with Spill Scenario, with one major difference. The number of fish removed at each dam under the Transportation with Spill Scenario was based on an FGE value that adjusted for spill. For our estimates under the Full Transportation Scenario, we used the FGE values developed during developmental testing of the diversion screens installed in each of the turbine intakes. Using the results from these tests, the FGEs for spring/summer Chinook salmon and sockeye salmon were changed from the values in Table 2 to 60.0%, 65.0%, 50.0%, and 80.0% at Lower Granite, Little Goose, Lower Monumental, and McNary Dams, respectively. Subyearling fall Chinook salmon FGEs were changed from the values in Table 2 to 55.0%, 60.0%, 40.0%, and 65.0% at Lower Granite, Little Goose, Lower Monumental, and McNary Dams, respectively. Steelhead FGEs (in Table 6) were changed from the values in Table 5 to 80.0%, 90.0%, 65.0%, and 90.0% at Lower Granite, Little Goose, Lower Monumental, and McNary Dams, respectively. Using the same formulas as under the Transportation with Spill Scenario, we derived the values found in Tables 3 and 6-10.

Because the adjusted FGE at Lower Granite Dam was changed from 41.8% to 60.0% for yearling spring/summer Chinook and sockeye salmon, the total number of fish collected at Lower Granite Dam will be 5,916,229 (9,860,382 x 0.60) spring/summer Chinook salmon and 17,971 (29,952 x 0.60) *O. nerka* salmon.

Because more PIT-tagged fish will be collected at the upstream dams, the number of PIT-tagged fish that are returned to the river and subsequently collected at McNary Dam will be different under this scenario. The effects of this are shown in Appendices A and B.

As under the Transportation with Spill Scenario, to estimate the number of spring/summer Chinook salmon smolts arriving at McNary Dam, we added the estimated numbers from the Columbia River above McNary (5,778,527) and the Snake River (927,585).

$$5,778,527 + 927,585 = 6,706,112$$

Tables 7-10 show the changes in percentages of listed fish at each dam.

Table 1. Estimated percentage composition of Snake River spring/summer Chinook salmon arriving at Lower Granite Dam from listed hatcheries compared with total hatchery releases projected for spring 2005.

Hatchery	2005 Total hatchery releases[a] AD-clipped	Non-AD-clipped	Survival to Lower Granite Dam Mean[b]	Fish to Lower Granite Dam AD-clipped	Non-AD-clipped
Dworshak[c]	1,272,963	0	0.778	990,365	0
Kooskia[c]	620,000	0	0.671	416,020	0
Lookingglass					
Imnaha[d]	435,186	0	0.647	281,565	0
Grande Ronde[d]	453,422	104,369	0.622	282,028	64,918
Clearwater[c]	1,849,633	0	0.605	1,119,028	0
Rapid River[c]	3,445,353	0	0.645	2,222,253	0
Sawtooth[d]	0	134,769	0.401	0	54,042
McCall[d]	1,267,530	105,230	0.541	685,734	56,929
Pahsimeroi[d]	975,252	0	0.583	568,572	0
Nez Perce[c]		75,000	0.605	0	45,375
Totals					
All stocks	10,319,339	419,368		6,565,565	221,264
Listed stocks	3,131,390	344,368		1,817,899	175,889
Percent of listed stocks	32.36663%			29.37731%	

a Data from IDFG and ODFW.

b Mean survival estimate made from PIT-tag detections of marked hatchery fish releases as part of the NMFS survival studies (Research Action #1212) for 1993-2004 (excluding 2001).

c Non-listed stocks.

d Listed stocks in 2005.

Table 2. Estimate of listed threatened and endangered species arriving at various locations during outmigration year 2005 under past transportation and spill conditions.

Yearling spring/summer Chinook salmon

Snake River ESU

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE[1] Granite	Goose	Low Mon**	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild	4,121,640	2,925,673	28.537	2,813,811	0.418	0.458	0.354	0.384	0.9	427,592	164,195	5.61
Listed Hatchery*** AD-clipped	4,121,640	2,925,673	18.436	1,817,899	0.418	0.458	0.354	0.384	0.9	281,359	108,042	3.69
Non-AD-clipped	4,121,640	2,925,673	1.784	175,889	0.418	0.458	0.354	0.384	0.9	128,805	49,461	1.69

Upper Columbia River ESU

Rearing type	Number of listed fish passing dam Wells	Rocky Reach	Rock Island	Of dam total, % listed fish Wells	Rocky Reach	Rock Island	FGE McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild****	337,725	393,728	727,705	15.9	15.8	16.2	0.384	0.9	530,498	203,711	6.96
Listed Hatchery AD-clipped	128,845	115,961	326,272	6.1	4.7	7.3	0.384	0.9	237,853	91,336	3.12
Non-AD-clipped	543,080	488,772	446,273	25.5	19.7	9.9	0.384	0.9	325,333	124,928	4.27

Fall Chinook salmon

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE[1] Granite	Goose	Low Mon	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild****	1,190,717	12,305,972	27.102	595,392	0.542	0.510	0.459	0.509	0.75	31,861	16,217	0.13
Listed Subyearling Hatchery AD-clipped	1,190,717	12,305,972	32.991	724,782	0.542	0.510	0.459	0.509	0.75	88,587	45,091	0.37
Non-AD-clipped	1,190,717	12,305,972	39.907	876,722	0.542	0.510	0.459	0.509	0.75	33,473	17,038	0.14
Listed Yearling Hatchery AD-clipped	4,121,640	2,925,673	2.634	259,742	0.418	0.458	0.354	0.384	0.9	153,298	58,866	2.10
Non-AD-clipped	4,121,640	2,925,673	0.0	0	0.418	0.458	0.354	0.384	0.9	118,571	45,531	1.56

Sockeye salmon

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE[1] Granite	Goose	Low Mon	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild and listed hatchery*****	10,513	560,730	90.4	27,084	0.351	0.408	0.395	0.255	0.9	4,131	1,053	0.19

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Listed wild and hatchery spring Chinook salmon enter the Snake River above Lower Monumental Dam. WDFW predicts that 30,000 wild and 201,218 listed hatchery (all non-AD-clipped) fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2005 (Michael Gallinat, WDFW, Pers. commun., February 2005)

***Note: Based on 2005 hatchery releases, it was estimated that 26.78569% and 2.59162% of the AD-clipped and non-AD-clipped, respectively, hatchery fish arriving at Lower Granite Dam are products of a listed hatchery (Table 1). Because Table 2 is based on the total collection at Lower Granite Dam, which includes both wild and hatchery (listed and unlisted) fish, these estimates of 26.78569% and 2.59162% of all hatchery fish were adjusted to 18.436% and 1.784% of the total collection at Lower Granite Dam.

****Note: Estimated values based on the average collection numbers from 1995-2004 (excluding 2001) (Fish Passage Center Weekly Reports), and on the average number of adult returns from 1994-2004 (excluding 2001) and the 2004 adult returns (FPC Weekly Reports 1994-2004).

*****Note: The Lower Granite Dam estimate is based on IDFG's estimate of 5,567 wild sockeye salmon smolts and 21,517 hatchery fish that overwintered in the lakes arriving at Lower Granite Dam in 2005 (Catherine Willard, IDFG, Pers. commun., February 2005). The McNary Dam estimate is the average collection count at McNary Dam from 1985-2004 (Annual Fish Passage Reports 1985-2004, and WDFW's 2004 fish counts).

1 The FGE used in this table is adjusted for spill conditions, and PIT-tag detection efficiency at a dam. This estimate was obtained from the NMFS survival studies conducted in 1995-2004 (excluding 2001) (Steven G. Smith, NMFS, Pers. commun., February 2005).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}})/(\text{FGE}_{\text{Granite}}))\text{x}(\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite})\text{x}(1\text{-FGE}_{\text{Granite}})\text{x}(\text{Project Survival})\text{x}(1\text{-FGE}_{\text{Goose}})\text{x}(\text{Project Survival})\text{x}(1\text{-FGE}_{\text{Low Mon}})\text{x}(\text{Project Survival})^2 +$
$(\text{listed Tucannon fish})\text{x}(1\text{-FGE}_{\text{Low Mon}})\text{x}(\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 30,000 wild and 201,218 hatchery (all non-AD-clipped)
PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table A1.

Table 3. Estimate of listed threatened and endangered species arriving at various locations during outmigration year 2005 under full transportation conditions (no spill).

Yearling spring/summer Chinook salmon

Snake River ESU

Rearing type	Total Collection* Granite	Total Collection* McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE Granite	FGE Goose	FGE Low Mon**	FGE McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	Of Fish Collected at McNary % Listed Fish
Wild	5,916,229	5,364,890	28.537	2,813,811	0.60	0.65	0.50	0.80	0.9	183,531	146,825	2.74
Listed Hatchery*** AD-clipped	5,916,229	5,364,890	18.436	1,817,899	0.60	0.65	0.50	0.80	0.9	128,357	102,686	1.91
Non-AD-clipped	5,916,229	5,364,890	1.784	175,889	0.60	0.65	0.50	0.80	0.9	89,571	71,657	1.34

Upper Columbia River ESU

Rearing type	Number of listed fish passing dam Wells	Number of listed fish passing dam Rocky Reach	Number of listed fish passing dam Rock Island	Of dam total, % listed fish Wells	Of dam total, % listed fish Rocky Reach	Of dam total, % listed fish Rock Island	FGE McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	Of Fish Collected at McNary % Listed Fish
Wild****	337,725	393,728	727,705	15.9	15.8	16.2	0.80	0.9	530,498	424,398	7.91
Listed Hatchery AD-clipped	128,845	115,961	326,272	6.1	4.7	7.3	0.80	0.9	237,853	190,282	3.55
Non-AD-clipped	543,080	488,772	446,273	25.5	19.7	9.9	0.80	0.9	325,333	260,266	4.85

Subyearling fall Chinook salmon

Rearing type	Total Collection* Granite	Total Collection* McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE Granite	FGE Goose	FGE Low Mon	FGE McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	Of Fish Collected at McNary % Listed Fish
Wild****	1,208,292	15,715,478	27.102	595,392	0.55	0.60	0.40	0.65	0.75	30,471	19,806	0.13
Listed Subyearling Hatchery AD-clipped	1,208,292	12,305,972	32.991	724,782	0.55	0.60	0.40	0.65	0.75	92,325	60,011	0.38
Non-AD-clipped	1,208,292	12,305,972	39.907	876,722	0.55	0.60	0.40	0.65	0.75	29,959	19,473	0.12
Listed Yearling Hatchery AD-clipped	5,916,229	5,364,890	2.634	259,742	0.60	0.65	0.50	0.80	0.9	103,702	82,962	1.55
Non-AD-clipped	5,916,229	5,364,890	0.0	0	0.60	0.65	0.50	0.80	0.9	91,773	73,418	1.37

Sockeye salmon

Rearing type	Total Collection* Granite	Total Collection* McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE Granite	FGE Goose	FGE Low Mon	FGE McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	Of Fish Collected at McNary % Listed Fish
Wild and listed hatchery*****	17,971	560,730	90.4	27,084	0.60	0.65	0.50	0.80	0.9	1,244	995	0.18

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Listed wild and hatchery spring Chinook salmon enter the Snake River above Lower Monumental Dam. WDFW predicts that 30,000 wild and 201,218 listed hatchery (all non-AD-clipped) fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2005 (Michael Gallinat, WDFW, Pers. commun., February 2005)

***Note: Based on 2005 hatchery releases, it was estimated that 26.78569% and 2.59162% of the AD-clipped and non-AD-clipped, respectively, hatchery fish arriving at Lower Granite Dam are products of a listed hatchery (Table 1). Because Table 2 is based on the total collection at Lower Granite Dam, which includes both wild and hatchery (listed and unlisted) fish, these estimates of 26.78569% and 2.59162% of all hatchery fish were adjusted to 18.436% and 1.784% of the total collection at Lower Granite Dam.

****Note: Estimated values based on the average collection numbers from 1995-2004 (excluding 2001) (Fish Passage Center Weekly Reports), and on the average number of adult returns from 1994-2004 (excluding 2001) and the 2004 adult returns (FPC Weekly Reports 1994-2004).

*****Note: The Lower Granite Dam estimate is based on IDFG's estimate of 5,567 wild sockeye salmon smolts and 21,517 hatchery fish that overwintered in the lakes arriving at Lower Granite Dam in 2005 (Catherine Willard, IDFG, Pers. commun., February 2005). The McNary Dam estimate is the average collection count at McNary Dam from 1985-2004 (Annual Fish Passage Reports 1985-2004, and WDFW's 2004 fish counts).

1 The FGE used in this table is adjusted for spill conditions, and PIT-tag detection efficiency at a dam. This estimate was obtained from the NMFS survival studies conducted in 1995-2004 (excluding 2001) (Steven G. Smith, NMFS, Pers. commun., February 2005).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}})/(\text{FGE}_{\text{Granite}}))x(\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite})x(1-\text{FGE}_{\text{Granite}})x(\text{Project Survival})x(1-\text{FGE}_{\text{Goose}})x(\text{Project Survival})x(1-\text{FGE}_{\text{Low Mon}})x(\text{Project Survival})^2$ + $(\text{listed Tucannon fish})x(1-\text{FGE}_{\text{Low Mon}})x(\text{Project Survival})^2$ +(PIT-tagged fish)

where: listed Tucannon fish = 30,000 wild and 201,218 hatchery (all non-AD-clipped)
PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table A1.

Table 4. Estimated percentage composition of Snake River steelhead arriving at Lower Granite Dam from total hatchery releases projected for spring 2005. No hatchery in the Snake River ESU above Lower Granite Dam is listed.

Hatchery	Total hatchery releases[a] 2005	Survival to Lower Granite Dam Mean	Fish to Lower Granite Dam
Dworshak	2,000,000	0.799[b]	1,598,000
Clearwater	843,000	0.677[b]	570,711
Hagerman	1,290,000	0.702[b]	905,580
Magic Valley	1,743,500	0.818[b]	1,426,183
Niagara Springs	1,800,000	0.820[b]	1,476,000
Irrigon (released above Lower Granite Dam)	877,000	0.799[0]	700,723
Lyons Ferry (released into Grande Ronde)	340,000	0.799[c]	271,660
Totals All stocks	8,893,500		6,948,857

[a] Data from IDFG, ODFW, USFWS, and WDFW.

[b] Survival estimate made from PIT-tag detections of marked hatchery fish releases as part of the NMFS survival studies (Research Action #1212) for 1999-2004 (excluding 2001).

[c] These hatcheries have no survival estimates from the NMFS survival studies, so they were set to the survival estimate of Dworshak National Fish Hatchery.

Table 5. Estimates of listed threatened and endangered steelhead arriving at various locations during outmigration year 2005 under past transportation and spill conditions.

Snake River ESU

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE[1] Granite	Goose	Low Mon**	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild	3,766,898	392,308	13.4828	1,082,909	0.469	0.518	0.466	0.196	0.9	110,860	21,729	5.54
Endemic (unlisted) hatchery	(For some, first dam reached is Lower Monumental Dam; for others, McNary Dam)							0.196	0.9	0	0	0.00

Upper Columbia River ESU

Rearing type	Number of listed fish passing dam Wells	Rocky Reach	Rock Island	Of dam total, % listed fish Wells	Rocky Reach	Rock Island	FGE[1] McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild***	111,730	133,327	152,875	18.7	19.4	16.1	0.196	0.9	111,446	21,843	5.57
Listed hatchery	486,482	544,668	785,059	81.3	79.2	82.9	0.196	0.9	683,704	134,006	34.16

Mid-Columbia River ESU

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE[1] Granite	Goose	Low Mon**	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Summer-run	(First dam reached is McNary Dam)							0.196	0.9	90,370	17,713	4.52
Winter-run	(First dam reached is Bonneville Dam)											

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Hatchery steelhead and listed wild steelhead enter the Snake River above Lower Monumental Dam. WDFW predicts that 25,000 wild fish and endemic and 220,000 non-listed hatchery fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2005. An additional 0 endemic and 237,000 non-listed Snake River hatchery steelhead will outmigrate from the Touchet and Walla Walla Rivers above McNary Dam (Michael Gillanat, WDFW, Pers. commun., February 2005).

***Note: Estimated values based on 2004 collection numbers (Fish Passage Center Weekly Reports), and on the number of adult returns from 1995-2004 (FPC Weekly Reports 1995-2004).

1 The FGE used in this table is adjusted for spill conditions, and PIT-tag detection efficiency at a dam. This estimate was obtained from the NMFS survival studies conducted in 1995-2004 (excluding 2001) (Steven G. Smith, NMFS, Pers. commun., February 2005).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}})/(\text{FGE}_{\text{Granite}}))\text{x}(\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite})\text{x}(1\text{-FGE}_{\text{Granite}})\text{x}(\text{Project Survival})\text{x}(1\text{-FGE}_{\text{Goose}})\text{x}(\text{Project Survival})\text{x}(1\text{-FGE}_{\text{Low Mon}})\text{x}(\text{Project Survival})^2 +$
$(\text{listed Tucannon fish})\text{x}(1\text{-FGE}_{\text{Low Mon}})\text{x}(\text{Project Survival})^2 + (\text{Rock Island listed fish})\text{x}(\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 25,000 wild
PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table B1.

Table 6. Estimates of listed threatened and endangered steelhead arriving at various locations during outmigration year 2005 under full transportation conditions (no spill).

Snake River ESU

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE Granite	Goose	Low Mon**	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild	6,425,413	1,159,400	13.4828	1,082,909	0.80	0.90	0.65	0.90	0.9	15,492	13,943	1.20
Endemic (unlisted) hatchery	(For some, first dam reached is Lower Monumental Dam; for others, McNary Dam)							0.90	0.9	0	0	0.00

Upper Columbia River ESU

Rearing type	Number of listed fish passing dam Wells	Rocky Reach	Rock Island	Of dam total, % listed fish Wells	Rocky Reach	Rock Island	FGE McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Wild***	111,730	133,327	152,875	18.7	19.4	16.1	0.90	0.9	111,446	100,301	8.65
Listed hatchery	486,482	544,668	785,059	81.3	79.2	82.9	0.90	0.9	683,704	615,334	53.07

Mid-Columbia River ESU

Rearing type	Total Collection* Granite	McNary	Of Granite Total % Listed Fish	Listed Fish to Granite[a]	FGE Granite	Goose	Low Mon**	McNary	Project Survival	Listed fish to McNary[b]	Of Fish Collected at McNary Listed Fish	% Listed Fish
Summer-run	(First dam reached is McNary Dam)							0.90	0.9	90,370	81,333	7.02
Winter-run	(First dam reached is Bonneville Dam)											

*Note: Total Collection is the total number of fish collected of that species or run, regardless of rearing type.

**Note: Hatchery steelhead and listed wild steelhead enter the Snake River above Lower Monumental Dam. WDFW predicts that 25,000 wild fish and endemic and 220,000 non-listed hatchery fish will outmigrate from the Tucannon River and Lyons Ferry Fish Hatchery in 2005. An additional 0 endemic and 237,000 non-listed Snake River hatchery steelhead will outmigrate from the Touchet and Walla Walla Rivers above McNary Dam (Michael Gillanat, WDFW, Pers. commun., February 2005).

***Note: Estimated values based on 2004 collection numbers (Fish Passage Center Weekly Reports), and on the number of adult returns from 1995-2004 (FPC Weekly Reports 1995-2004).

Formulas:

a) Listed fish to Granite = $((\text{Collection}_{\text{Granite}})/(\text{FGE}_{\text{Granite}}))x(\text{Of Granite Total \% Listed Fish})$

b) Listed Fish to McNary = $(\text{Listed Fish to Granite})x(1-\text{FGE}_{\text{Granite}})x(\text{Project Survival})x(1-\text{FGE}_{\text{Goose}})x(\text{Project Survival})x(1-\text{FGE}_{\text{Low Mon}})x(\text{Project Survival})^2 +$ $(\text{listed Tucannon fish})x(1-\text{FGE}_{\text{Low Mon}})x(\text{Project Survival})^2 + (\text{Rock Island listed fish})x(\text{Project Survival})^2 + (\text{PIT-tagged fish})$

where: listed Tucannon fish = 25,000 wild
PIT-tagged fish = fish collected at Snake River dams, returned to the river, and subsequently arrived at McNary Dam; See Appendix Table B1.

Table 7a. Juvenile Chinook salmon collection at each of eight mainstem collection facilities in 2005 under a full transportation scenario.

	Full Transportation Scenario							
	Chinook salmon							
	Yearlings					Subyearlings		
Total fish collected at:*								
Lower Granite			5,916,229				1,248,066	
Little Goose			2,353,216				459,515	
Lower Monumental			1,005,077				183,971	
Ice Harbor**			618,391				93,135	
Columbia River								
Wells***			2,128,968				NA	
Rocky Reach***			2,485,566				NA	
Rock Island***			4,495,636				NA	
Wanapum***			4,046,072				NA	
Priest Rapids***			3,641,465				NA	
McNary****			5,364,890				15,715,484	
John Day** ****			1,966,074				4,190,592	
The Dalles** ****			1,818,149				2,244,960	
Bonneville (I & II combined)** *****			2,832,795				8,296,728	
---To the tailrace of Bonneville			7,081,988				27,655,760	
---To Tongue Point*****			38,509,029				86,069,984	
	Spring/Summer Chinook			Fall Chinook - Yearlings		Fall Chinook - Subyearlings		
		Hatchery		Hatchery			Hatchery	
Total listed fish at:	Wild	Ad-clip	No Ad-clip	Ad-clip	No Ad-clip	Wild	Ad-clip	No Ad-clip
Lower Granite	1,688,286	1,090,739	105,534	155,845	0	327,466	398,630	521,971
Little Goose	679,473	439,609	41,158	60,780	0	120,567	146,768	192,180
Lower Monumental	198,055	127,046	110,582	128,027	113,300	36,113	109,422	38,436
Ice Harbor**	122,354	85,572	59,714	69,135	61,182	18,282	55,395	19,458
Columbia River								
Wells***	337,725	128,845	543,080	0	0	NA	NA	NA
Rocky Reach***	393,728	115,961	488,772	0	0	NA	NA	NA
Rock Island***	727,705	326,272	446,273	0	0	NA	NA	NA
Wanapum***	654,935	293,645	401,646	0	0	NA	NA	NA
Priest Rapids***	589,442	264,281	361,481	0	0	NA	NA	NA
McNary****	571,223	292,968	331,922	82,962	73,418	19,806	60,011	21,080
John Day** ****	77,115	39,551	44,809	11,200	9,911	2,800	8,482	2,980
The Dalles** ****	46,269	23,731	26,885	6,720	5,947	1,500	4,544	1,596
Bonneville (I & II combined)** *****	41,642	21,358	24,197	6,048	5,352	119,708	4,454,136	1,138,436
---To the tailrace of Bonneville	104,105	53,395	60,493	15,120	13,380	399,027	14,847,120	3,794,787
---To Tongue Point*****	12,481,352	1,929,672	649,689	442,734	200,098	13,089,831	16,229,451	25,893,629
Percent listed fish at:								
Lower Granite	28.54%	18.44%	1.78%	2.63%	0.00%	26.24%	31.94%	41.82%
Little Goose	28.87%	18.68%	1.75%	2.58%	0.00%	26.24%	31.94%	41.82%
Lower Monumental	19.71%	12.64%	11.00%	12.74%	11.27%	19.63%	59.48%	20.89%
Ice Harbor**	19.79%	13.84%	9.66%	11.18%	9.89%	19.63%	59.48%	20.89%
Columbia River								
Wells***	15.86%	6.05%	25.51%	0.00%	0.00%	NA	NA	NA
Rocky Reach***	15.84%	4.67%	19.66%	0.00%	0.00%	NA	NA	NA
Rock Island***	16.19%	7.26%	9.93%	0.00%	0.00%	NA	NA	NA
Wanapum***	16.19%	7.26%	9.93%	0.00%	0.00%	NA	NA	NA
Priest Rapids***	16.19%	7.26%	9.93%	0.00%	0.00%	NA	NA	NA
McNary****	10.65%	5.46%	6.19%	1.55%	1.37%	0.13%	0.38%	0.13%
John Day** ****	3.92%	2.01%	2.28%	0.57%	0.50%	0.07%	0.20%	0.07%
The Dalles** ****	2.54%	1.31%	1.48%	0.37%	0.33%	0.07%	0.20%	0.07%
Bonneville (I & II combined)** *****	1.47%	0.75%	0.85%	0.21%	0.19%	1.44%	53.69%	13.72%
---To the tailrace of Bonneville	1.47%	0.75%	0.85%	0.21%	0.19%	1.44%	53.69%	13.72%
---To Tongue Point*****	32.41%	5.01%	1.69%	1.15%	0.52%	15.21%	18.86%	30.08%

* Note:	"Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
** Note:	These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
*** Note:	The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.
**** Note:	(See next page)
***** Note:	(See next page)

**** Note:	The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:							
	For example, If you handle 1,000 yearling Chinook salmon at Tongue Point, under the Full Transportation with spill scenario (above),							
	32.41% of them will be listed wild fish, or 324 fish. To these 324 fish, apply the percentages							
	listed below under the Tongue Point section to determine how many are from each ESU							
	(SR, 324 x 0.3291 = 107; UCR, 324 x 0.0584 = 19; etc).							
	Yearling	**Full Transportation**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR - Spr/Sum	25.70	27.30	10.50				
	SR - Fall (Yrlg)	-	22.10	10.70				
	UCR	74.30	50.60	78.80				
	LCR - Spring	-	-	-				
	UWR	-	-	-				
	Subyearling							
	Chinook salmon							
	SR - Fall (Subyrlg)	100.00	100.00	100.00				
	LCR - Tule fall	-	-	-				
	LCR - Late run fall	-	-	-				
***** Note:	Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at							
	100% to Tongue Point.							
	The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:							
	Bonneville Dam							
	Yearling	**Full Transportation**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR - Spr/Sum	25.70	27.30	10.50				
	SR - Fall (Yrlg)	-	22.10	10.70				
	UCR	74.30	50.60	78.80				
	LCR - Spring	-	-	-				
	UWR	-	-	-				
	Subyearling							
	Chinook salmon							
	SR - Fall (Subyrlg)	1.13	0.09	0.12				
	LCR - Tule fall	98.87	99.91	99.88				
	LCR - Late run fall	-	-	-				
	Tongue Point							
	Yearling	**Full Transportation**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR - Spr/Sum	21.52	20.80	32.50				
	SR - Fall (Yrlg)	-	5.30	19.00				
	UCR	3.82	2.40	34.10				
	LCR - Spring	9.23	27.20	14.30				
	UWR	65.43	44.30	-				
	Subyearling							
	Chinook salmon							
	SR - Fall (Subyrlg)	3.88	4.49	2.78				
	LCR - Tule fall	65.49	95.51	97.22				
	LCR - Late run fall	30.63	-	-				
	SR - Spr/Sum = Snake River ESU - Spring/Summer Chinook salmon							
	SR - Fall (Yrlg) = Snake River ESU - Yearling Fall Chinook salmon							
	SR - Fall (Subyrlg) = Snake River ESU - Subyearling Fall Chinook salmon							
	UCR = Upper Columbia River ESU							
	LCR - Spring = Lower Columbia River ESU - Spring Chinook salmon							
	UWR = Upper Willamette River ESU							
	LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon							
	LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon							

Table 7b. Juvenile Chinook salmon collection at each of eight mainstem collection facilities in 2005 under a transportation with spill scenario.

	Transportation with Spill Scenario							
	Chinook salmon							
	Yearlings					Subyearlings		
Total fish collected at:*								
Lower Granite			4,121,640				1,229,912	
Little Goose			2,388,034				399,870	
Lower Monumental			1,189,609				236,327	
Ice Harbor**			1,226,941				94,009	
Columbia River								
Wells***			2,128,968				NA	
Rocky Reach***			2,485,566				NA	
Rock Island***			4,495,636				NA	
Wanapum***			4,046,072				NA	
Priest Rapids***			3,641,465				NA	
McNary****			2,925,673				12,305,972	
John Day** ****			881,108				2,861,431	
The Dalles** ****			2,904,211				1,782,453	
Bonneville (I & II combined)** *****			1,857,497				6,383,182	
---To the tailrace of Bonneville			9,525,626				26,268,239	
---To Tongue Point*****			37,104,975				81,247,508	
	Spring/Summer Chinook			Fall Chinook - Yearlings		Fall Chinook - Subyearlings		
		Hatchery		Hatchery			Hatchery	
Total listed fish at:	Wild	Ad-clip	No Ad-clip	Ad-clip	No Ad-clip	Wild	Ad-clip	No Ad-clip
Lower Granite	1,176,173	759,882	73,521	108,572	0	322,703	392,832	514,378
Little Goose	685,362	443,095	42,195	62,312	0	104,917	127,718	167,235
Lower Monumental	278,209	177,637	87,140	103,710	80,216	48,057	133,617	54,653
Ice Harbor**	285,060	187,573	85,870	102,198	79,047	19,117	53,152	21,741
Columbia River								
Wells***	337,725	128,845	543,080	0	0	NA	NA	NA
Rocky Reach***	393,728	115,961	488,772	0	0	NA	NA	NA
Rock Island***	727,705	326,272	446,273	0	0	NA	NA	NA
Wanapum***	654,935	293,645	401,646	0	0	NA	NA	NA
Priest Rapids***	589,442	264,281	361,481	0	0	NA	NA	NA
McNary****	367,906	199,378	174,389	58,866	45,531	16,217	45,091	18,443
John Day** ****	74,363	40,299	35,248	11,898	9,203	3,532	9,819	4,016
The Dalles** ****	191,219	103,626	90,638	30,595	23,665	2,200	6,116	2,502
Bonneville (I & II combined)** *****	83,897	45,466	39,767	13,424	10,383	97,474	3,608,996	922,794
---To the tailrace of Bonneville	430,241	233,159	203,933	68,841	53,246	401,128	14,851,835	3,797,506
---To Tongue Point*****	12,219,262	1,778,253	581,178	402,301	178,993	9,070,763	16,218,593	25,877,390
Percent listed fish at:								
Lower Granite	28.54%	18.44%	1.78%	2.63%	0.00%	26.24%	31.94%	41.82%
Little Goose	28.70%	18.55%	1.77%	2.61%	0.00%	26.24%	31.94%	41.82%
Lower Monumental	23.39%	14.93%	7.33%	8.72%	6.74%	20.33%	56.54%	23.13%
Ice Harbor**	23.23%	15.29%	7.00%	8.33%	6.44%	20.34%	56.54%	23.13%
Columbia River								
Wells***	15.86%	6.05%	25.51%	0.00%	0.00%	NA	NA	NA
Rocky Reach***	15.84%	4.67%	19.66%	0.00%	0.00%	NA	NA	NA
Rock Island***	16.19%	7.26%	9.93%	0.00%	0.00%	NA	NA	NA
Wanapum***	16.19%	7.26%	9.93%	0.00%	0.00%	NA	NA	NA
Priest Rapids***	16.19%	7.26%	9.93%	0.00%	0.00%	NA	NA	NA
McNary****	12.58%	6.81%	5.96%	2.01%	1.56%	0.13%	0.37%	0.15%
John Day** ****	8.44%	4.57%	4.00%	1.35%	1.04%	0.12%	0.34%	0.14%
The Dalles** ****	6.58%	3.57%	3.12%	1.05%	0.81%	0.12%	0.34%	0.14%
Bonneville (I & II combined)** *****	4.52%	2.45%	2.14%	0.72%	0.56%	1.53%	56.54%	14.46%
---To the tailrace of Bonneville	4.52%	2.45%	2.14%	0.72%	0.56%	1.53%	56.54%	14.46%
---To Tongue Point*****	32.93%	4.79%	1.57%	1.08%	0.48%	11.16%	19.96%	31.85%

* Note:	"Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
** Note:	These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
*** Note:	The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected;
	FGE's at these dams are not currently established. Also, there is no transportation from these dams.
**** Note:	(See next page)
***** Note:	(See next page)

**** Note: The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:

For example, If you handle 1,000 yearling Chinook salmon at Tongue Point, under the Full Transportation with spill scenario (above),
32.93% of them will be listed wild fish, or 329 fish. To these 329 fish, apply the percentages
listed below under the Tongue Point section to determine how many are from each ESU
(SR, 329 x 0.3122 = 103; UCR, 329 x 0.0550 = 18; etc).

Yearling	**Full Transportation with spill**		
Chinook salmon		**Hatchery**	
	Wild	**Ad-clip**	**No Ad-clip**
SR - Spr/Sum	44.63	41.80	22.50
SR - Fall (Yrlg)	-	22.80	20.70
UCR	55.37	35.40	56.80
LCR - Spring	-	-	-
UWR	-	-	-
Subyearling			
Chinook salmon			
SR - Fall (Subyrlg)	100.00	100.00	100.00
LCR - Tule fall	-	-	-
LCR - Late run fall	-	-	-

***** Note: Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at 100% to Tongue Point.

The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:

Bonneville Dam			
Yearling	**Full Transportation with spill**		
Chinook salmon		**Hatchery**	
	Wild	**Ad-clip**	**No Ad-clip**
SR - Spr/Sum	44.63	41.80	22.50
SR - Fall (Yrlg)	-	22.80	20.70
UCR	55.37	35.40	56.80
LCR - Spring	-	-	-
UWR	-	-	-
Subyearling			
Chinook salmon			
SR - Fall (Subyrlg)	1.65	0.12	0.18
LCR - Tule fall	98.35	99.88	99.82
LCR - Late run fall	-	-	-
Tongue Point			
Yearling	**Full Transportation with spill**		
Chinook salmon		**Hatchery**	
	Wild	**Ad-clip**	**No Ad-clip**
SR - Spr/Sum	20.18	19.50	34.10
SR - Fall (Yrlg)	-	5.00	19.70
UCR	3.55	2.40	29.80
LCR - Spring	9.43	27.80	16.50
UWR	66.83	45.30	-
Subyearling			
Chinook salmon			
SR - Fall (Subyrlg)	3.81	4.42	2.94
LCR - Tule fall	65.54	95.58	97.06
LCR - Late run fall	30.65	-	-

SR - Spr/Sum = Snake River ESU - Spring/Summer Chinook salmon
SR - Fall (Yrlg) = Snake River ESU - Yearling Fall Chinook salmon
SR - Fall (Subyrlg) = Snake River ESU - Subyearling Fall Chinook salmon
UCR = Upper Columbia River ESU
LCR - Spring = Lower Columbia River ESU - Spring Chinook
UWR = Upper Willamette River ESU

LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon
LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon

Table 7c. Juvenile sockeye and coho salmon collection at each of eight mainstem collection facilities in 2005 under full transportation and transportation with spill scenarios.

	Full Transportation Scenario				Transportation with Spill Scenario			
	Sockeye salmon	Coho salmon			Sockeye salmon	Coho salmon		
Total fish collected at:*								
Lower Granite	17,971		296,317		10,513		206,434	
Little Goose	7,009		115,564		7,138		118,478	
Lower Monumental	1,698		28,002		3,682		44,670	
Ice Harbor**	917		15,121		3,045		44,019	
Columbia River								
Wells***	NA		758,746		NA		758,746	
Rocky Reach***	NA		682,871		NA		682,871	
Rock Island***	NA		1,825,683		NA		1,825,683	
Wanapum***	NA		1,643,115		NA		1,643,115	
Priest Rapids***	NA		1,478,804		NA		1,478,804	
McNary****	560,730		2,968,012		560,730		1,441,291	
John Day** ****	884,634		1,336,631		179,876		509,709	
The Dalles** ****	530,780		801,979		530,782		1,310,680	
Bonneville (I & II combined)** *****	477,702		2,375,399		212,578		1,381,199	
---To the tailrace of Bonneville	1,194,255		5,938,498		1,194,258		7,083,072	
---To Tongue Point*****	1,781,663		26,402,583		1,776,321		25,950,135	
		Coho salmon				Coho salmon		
	Sockeye		Hatchery		Sockeye		Hatchery	
Total listed fish at:	salmon	Wild	Ad-clip	No Ad-clip	salmon	Wild	Ad-clip	No Ad-clip
Lower Granite	16,250	0	0	0	9,506	0	0	0
Little Goose	6,338	0	0	0	6,454	0	0	0
Lower Monumental	1,536	0	0	0	3,329	0	0	0
Ice Harbor**	829	0	0	0	2,753	0	0	0
Columbia River								
Wells***	NA	0	0	0	NA	0	0	0
Rocky Reach***	NA	0	0	0	NA	0	0	0
Rock Island***	NA	0	0	0	NA	0	0	0
Wanapum***	NA	0	0	0	NA	0	0	0
Priest Rapids***	NA	0	0	0	NA	0	0	0
McNary****	995	0	0	0	1,053	0	0	0
John Day** ****	134	0	0	0	338	0	0	0
The Dalles** ****	80	0	0	0	997	0	0	0
Bonneville (I & II combined)** *****	72	37,646	0	0	399	18,352	0	0
---To the tailrace of Bonneville	180	94,115	0	0	2,242	94,113	0	0
---To Tongue Point*****	25,299	1,199,305	15,951,000	0	22,584	1,199,303	15,951,000	0
Percent listed fish at:								
Lower Granite	90.42%	0.00%	0.00%	0.00%	90.42%	0.00%	0.00%	0.00%
Little Goose	90.43%	0.00%	0.00%	0.00%	90.42%	0.00%	0.00%	0.00%
Lower Monumental	90.46%	0.00%	0.00%	0.00%	90.41%	0.00%	0.00%	0.00%
Ice Harbor**	90.40%	0.00%	0.00%	0.00%	90.41%	0.00%	0.00%	0.00%
Columbia River		0.00%	0.00%	0.00%		0.00%	0.00%	0.00%
Wells***	NA	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Rocky Reach***	NA	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Rock Island***	NA	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Wanapum***	NA	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Priest Rapids***	NA	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
McNary****	0.18%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%
John Day** ****	0.02%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%
The Dalles** ****	0.02%	0.00%	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%
Bonneville (I & II combined)** *****	0.02%	1.58%	0.00%	0.00%	0.19%	1.33%	0.00%	0.00%
		0.00%	0.00%	0.00%		0.00%	0.00%	0.00%
---To the tailrace of Bonneville	0.02%	1.58%	0.00%	0.00%	0.19%	1.33%	0.00%	0.00%
---To Tongue Point*****	1.42%	4.54%	60.41%	0.00%	1.27%	4.62%	61.47%	0.00%

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.

Table 8a. Juvenile yearling Chinook salmon collection at each of the mainstem collection facilities in 2005 under a full transportation scenario. Percentage of listed fish at each facility.

****Use this table only if the reartype of all handled fish is known****

	Full Transportation Scenario				
	Yearling Chinook salmon				
	Unclipped			Clipped	
Total fish collected at:*					
Lower Granite		1,821,045		4,095,184	
Little Goose		731,249		1,621,968	
Lower Monumental		424,510		580,567	
Ice Harbor**		244,640		373,751	
Columbia River					
Wells***		930,381		1,198,587	
Rocky Reach***		927,118		1,558,448	
Rock Island***		1,214,134		3,281,502	
Wanapum***		1,092,721		2,953,352	
Priest Rapids***		983,449		2,658,017	
McNary****		2,041,901		3,322,987	
John Day** ****		996,176		969,898	
The Dalles** ****		793,786		1,024,364	
Bonneville (I & II combined)** *****		714,407		2,118,388	
---To the tailrace of Bonneville		1,786,018		5,295,970	
---To Tongue Point*****		16,197,493		22,311,535	

	Spring/Summer Chinook		Fall Chinook	Spring/Summer Chinook	Fall Chinook
		Hatchery	Hatchery	Hatchery	Hatchery
Total listed fish at:	Wild	No Ad-clip	No Ad-clip	Ad-clip	Ad-clip
Lower Granite	1,688,286	105,534	0	1,090,739	155,845
Little Goose	679,473	41,158	0	439,609	60,780
Lower Monumental	198,055	110,582	113,300	127,046	128,027
Ice Harbor**	122,354	59,714	61,182	85,572	69,135
Columbia River					
Wells***	337,725	543,080	0	128,845	0
Rocky Reach***	393,728	488,772	0	115,961	0
Rock Island***	727,705	446,273	0	326,272	0
Wanapum***	654,935	401,646	0	293,645	0
Priest Rapids***	589,442	361,481	0	264,281	0
McNary****	571,223	331,922	73,418	292,968	82,962
John Day** ****	77,115	44,809	9,911	39,551	11,200
The Dalles** ****	46,269	26,885	5,947	23,731	6,720
Bonneville (I & II combined)** *****	41,642	24,197	5,352	21,358	6,048
---To the tailrace of Bonneville	104,105	60,493	13,380	53,395	15,120
---To Tongue Point*****	12,481,352	649,689	200,098	1,929,672	442,734
Percent listed fish at:					
Lower Granite	92.71%	5.80%	0.00%	26.64%	3.81%
Little Goose	92.92%	5.63%	0.00%	27.10%	3.75%
Lower Monumental	46.65%	26.05%	26.69%	21.88%	22.05%
Ice Harbor**	50.01%	24.41%	25.01%	22.90%	18.50%
Columbia River					
Wells***	36.30%	58.37%	0.00%	10.75%	0.00%
Rocky Reach***	42.47%	52.72%	0.00%	7.44%	0.00%
Rock Island***	59.94%	36.76%	0.00%	9.94%	0.00%
Wanapum***	59.94%	36.76%	0.00%	9.94%	0.00%
Priest Rapids***	59.94%	36.76%	0.00%	9.94%	0.00%
McNary****	27.98%	16.26%	3.60%	8.82%	2.50%
John Day** ****	7.74%	4.50%	0.99%	4.08%	1.15%
The Dalles** ****	5.83%	3.39%	0.75%	2.32%	0.66%
Bonneville (I & II combined)** *****	5.83%	3.39%	0.75%	1.01%	0.29%
---To the tailrace of Bonneville	5.83%	3.39%	0.75%	1.01%	0.29%
---To Tongue Point*****	77.06%	4.01%	1.24%	8.65%	1.98%

* Note:	"Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
** Note:	These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
*** Note:	The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.
**** Note:	(See next page)
***** Note:	(See next page)

**** Note:	The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:							
	For example, If you handle 1,000 yearling Chinook salmon at Tongue Point, under the Full Transportation with spill scenario (above),							
	77.06% of them will be listed wild fish, or 771 fish. To these 771 fish, apply the percentages							
	listed below under the Tongue Point section to determine how many are from each ESU							
	(SR, 771 x 0.3291 = 254; UCR, 771 x 0.0584 = 45; etc).							
	Spring/Summer	**Full Transportation**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR	25.70	27.30	10.50				
	UCR	74.30	50.60	78.80				
	LCR - Spring	-	-	-				
	UWR	-	-	-				
	Fall							
	Chinook salmon							
	SR	100.00	100.00	100.00				
	LCR - Tule fall	-	-	-				
	LCR - Late run fall	-	-	-				
***** Note:	Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at							
	100% to Tongue Point.							
	The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:							
	Bonneville Dam							
	Spring/Summer	**Full Transportation**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR	25.70	27.30	10.50				
	UCR	74.30	50.60	78.80				
	LCR - Spring	-	-	-				
	UWR	-	-	-				
	Fall							
	Chinook salmon							
	SR	1.13	0.09	0.12				
	LCR - Tule fall	98.87	99.91	99.88				
	LCR - Late run fall	-	-	-				
	Tongue Point							
	Spring/Summer	**Full Transportation**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR	21.52	20.80	32.50				
	UCR	3.82	2.40	34.10				
	LCR - Spring	9.23	27.20	14.30				
	UWR	65.43	44.30	-				
	Fall							
	Chinook salmon							
	SR	3.88	4.49	2.78				
	LCR - Tule fall	65.49	95.51	97.22				
	LCR - Late run fall	30.63	-	-				
	SR = Snake River ESU							
	UCR = Upper Columbia River ESU							
	LCR - Spring = Lower Columbia River ESU - Spring Chinook							
	UWR = Upper Willamette River ESU							
	LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon							
	LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon							

Table 8b. Juvenile yearling Chinook salmon collection at each of the mainstem collection facilities in 2005 under a transportation with spill scenario. Percentage of listed fish at each facility.

****Use this table only if the reartype of all handled fish is known****

	Transportation with Spill Scenario				
	Yearling Chinook salmon				
	Unclipped			Clipped	
Total fish collected at:*					
Lower Granite	1,268,661			2,852,978	
Little Goose	738,444			1,649,590	
Lower Monumental	449,670			739,938	
Ice Harbor**	454,022			772,918	
Columbia River					
Wells***	930,381			1,198,587	
Rocky Reach***	927,118			1,558,448	
Rock Island***	1,214,134			3,281,502	
Wanapum***	1,092,721			2,953,352	
Priest Rapids***	983,449			2,658,017	
McNary****	1,100,717			1,824,954	
John Day** ****	390,604			490,504	
The Dalles** ****	1,200,490			1,703,721	
Bonneville (I & II combined)** *****	526,715			1,330,782	
---To the tailrace of Bonneville	2,701,103			6,824,523	
---To Tongue Point*****	15,692,526			21,412,446	

	Spring/Summer Chinook		Fall Chinook	Spring/Summer Chinook	Fall Chinook
		Hatchery	Hatchery	Hatchery	Hatchery
Total listed fish at:	Wild	No Ad-clip	No Ad-clip	Ad-clip	Ad-clip
Lower Granite	1,176,173	73,521	0	759,882	108,572
Little Goose	685,362	42,195	0	443,095	62,312
Lower Monumental	278,209	87,140	80,216	177,637	103,710
Ice Harbor**	285,060	85,870	79,047	187,573	102,198
Columbia River					
Wells***	337,725	543,080	0	128,845	0
Rocky Reach***	393,728	488,772	0	115,961	0
Rock Island***	727,705	446,273	0	326,272	0
Wanapum***	654,935	401,646	0	293,645	0
Priest Rapids***	589,442	361,481	0	264,281	0
McNary****	367,906	174,389	45,531	199,378	58,866
John Day** ****	74,363	35,248	9,203	40,299	11,898
The Dalles** ****	191,219	90,638	23,665	103,626	30,595
Bonneville (I & II combined)** *****	83,897	39,767	10,383	45,466	13,424
---To the tailrace of Bonneville	430,241	203,933	53,246	233,159	68,841
---To Tongue Point*****	12,219,262	581,178	178,993	1,778,253	402,301
Percent listed fish at:					
Lower Granite	92.71%	5.80%	0.00%	26.64%	3.81%
Little Goose	92.81%	5.71%	0.00%	26.86%	3.78%
Lower Monumental	61.87%	19.38%	17.84%	24.01%	14.02%
Ice Harbor**	62.79%	18.91%	17.41%	24.27%	13.22%
Columbia River					
Wells***	36.30%	58.37%	0.00%	10.75%	0.00%
Rocky Reach***	42.47%	52.72%	0.00%	7.44%	0.00%
Rock Island***	59.94%	36.76%	0.00%	9.94%	0.00%
Wanapum***	59.94%	36.76%	0.00%	9.94%	0.00%
Priest Rapids***	59.94%	36.76%	0.00%	9.94%	0.00%
McNary****	33.42%	15.84%	4.14%	10.93%	3.23%
John Day** ****	19.04%	9.02%	2.36%	8.22%	2.43%
The Dalles** ****	15.93%	7.55%	1.97%	6.08%	1.80%
Bonneville (I & II combined)** *****	15.93%	7.55%	1.97%	3.42%	1.01%
---To the tailrace of Bonneville	15.93%	7.55%	1.97%	3.42%	1.01%
---To Tongue Point*****	77.87%	3.70%	1.14%	8.30%	1.88%

* Note:	"Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.
** Note:	These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.
*** Note:	The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.
**** Note:	(See next page)
***** Note:	(See next page)

**** Note:	The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at McNary, John Day, and The Dalles Dams are:							
	For example, If you handle 1,000 yearling Chinook salmon at Tongue Point, under the Full Transportation with spill scenario (above),							
	77.06% of them will be listed wild fish, or 771 fish. To these 771 fish, apply the percentages							
	listed below under the Tongue Point section to determine how many are from each ESU							
	(SR, 771 x 0.3291 = 254; UCR, 771 x 0.0584 = 45; etc).							
	Spring/Summer	**Full Transportation with spill**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR	44.63	41.80	22.50				
	UCR	55.37	35.40	56.80				
	LCR - Spring	-	-	-				
	UWR	-	-	-				
	Fall							
	Chinook salmon							
	SR	100.00	100.00	100.00				
	LCR - Tule fall	-	-	-				
	LCR - Late run fall	-	-	-				
***** Note:	Because the Columbia River is a free flowing river below Bonneville Dam and there are no survival estimates available, survival was set at							
	100% to Tongue Point.							
	The percentage of listed wild and hatchery spring/summer and fall Chinook salmon at and downstream of Bonneville Dam are:							
	Bonneville Dam							
	Spring/Summer	**Full Transportation with spill**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR	44.63	41.80	22.50				
	UCR	55.37	35.40	56.80				
	LCR - Spring	-	-	-				
	UWR	-	-	-				
	Fall							
	Chinook salmon							
	SR	1.65	0.12	0.18				
	LCR - Tule fall	98.35	99.88	99.82				
	LCR - Late run fall	-	-	-				
	Tongue Point							
	Spring/Summer	**Full Transportation with spill**						
	Chinook salmon		**Hatchery**					
		Wild	**Ad-clip**	**No Ad-clip**				
	SR	20.18	19.50	34.10				
	UCR	3.55	2.40	29.80				
	LCR - Spring	9.43	27.80	16.50				
	UWR	66.83	45.30	-				
	Fall							
	Chinook salmon							
	SR	3.81	4.42	2.94				
	LCR - Tule fall	65.54	95.58	97.06				
	LCR - Late run fall	30.65	-	-				
	SR = Snake River ESU							
	UCR = Upper Columbia River ESU							
	LCR - Spring = Lower Columbia River ESU - Spring Chinook							
	UWR = Upper Willamette River ESU							
	LCR - Tule fall = Lower Columbia River ESU - Tule fall Chinook salmon							
	LCR - Late run fall = Lower Columbia River ESU - Late-run bright fall Chinook salmon							

Table 9. Juvenile steelhead trout collection at each of the mainstem collection facilities in 2005 under full transportation and transportation with spill scenarios.

	Full Transportation Scenario		Transportation with Spill Scenario	
	Wild steelhead trout	Listed hatchery steelhead trout	Wild steelhead trout	Listed hatchery steelhead trout
Total fish collected at:*				
Snake River				
Lower Granite	6,425,413	6,425,413	3,766,898	3,766,898
Little Goose	1,321,232	1,321,232	1,995,059	1,995,059
Lower Monumental	269,294	269,294	902,718	902,718
Ice Harbor**	116,683	116,683	711,731	711,731
Columbia River				
Wells***	598,142	598,142	598,142	598,142
Rocky Reach***	687,645	687,645	687,645	687,645
Rock Island***	946,619	946,619	946,619	946,619
Wanapum***	851,957	851,957	851,957	851,957
Priest Rapids***	766,761	766,761	766,761	766,761
McNary****	1,159,400	1,159,400	392,309	392,309
John Day** ****	349,338	349,338	481,673	481,673
The Dalles** ****	337,154	337,154	936,735	936,735
Bonneville (I & II combined)** *****	463,270	463,270	445,801	445,801
---To the tailrace of Bonneville	842,309	842,309	1,921,556	1,921,556
---To Tongue Point****	13,692,298	13,692,298	12,704,332	12,704,332
Total listed fish at:				
Snake River				
Lower Granite	866,327	0	507,884	0
Little Goose	178,581	0	269,139	0
Lower Monumental	30,161	0	117,632	0
Ice Harbor**	12,910	0	92,383	0
Columbia River				
Wells***	111,730	486,482	111,730	486,482
Rocky Reach***	133,327	544,668	133,327	544,668
Rock Island***	152,875	785,059	152,875	785,059
Wanapum***	137,588	706,553	137,588	706,553
Priest Rapids***	123,829	635,898	123,829	635,898
McNary****	195,577	615,334	61,285	134,006
John Day** ****	173,370	43,073	119,499	130,114
The Dalles** ****	144,032	27,690	237,046	222,629
Bonneville (I & II combined)** *****	177,589	27,413	113,753	92,970
---To the tailrace of Bonneville	322,889	49,842	490,315	400,733
---To Tongue Point****	2,018,331	665,176	1,876,792	534,739
Percent listed fish at:				
Snake River				
Lower Granite	13.48%	0.00%	13.48%	0.00%
Little Goose	13.52%	0.00%	13.49%	0.00%
Lower Monumental	11.20%	0.00%	13.03%	0.00%
Ice Harbor**	11.06%	0.00%	12.98%	0.00%
Columbia River				
Wells***	18.68%	81.33%	18.68%	81.33%
Rocky Reach***	19.39%	79.21%	19.39%	79.21%
Rock Island***	16.15%	82.93%	16.15%	82.93%
Wanapum***	16.15%	82.93%	16.15%	82.93%
Priest Rapids***	16.15%	82.93%	16.15%	82.93%
McNary****	16.87%	53.07%	15.62%	34.16%
John Day** ****	49.63%	12.33%	24.81%	27.01%
The Dalles** ****	42.72%	8.21%	25.31%	23.77%
Bonneville (I & II combined)** *****	38.33%	5.92%	25.52%	20.86%
---To the tailrace of Bonneville	38.33%	5.92%	25.52%	20.86%
---To Tongue Point****	14.74%	4.86%	14.77%	4.21%

* Note: "Total fish collected at:" is the total number of fish collected of that species or run, regardless of rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established at this time. Also, there is no transportation from these dams.

**** Note: (See next page)

**** Note: The percentage of listed wild and hatchery fish from each ESU at each Columbia River dam from McNary Dam to Bonneville Dam and at Tongue Point.

For example, If you handle 1,000 steelhead at Tongue Point, under the Full Transportation with spill scenario (above), 14.77% of them will be listed wild fish, or 148 fish. To these 148 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 148 x 0.5283 = 78; UCR, 148 x 0.0439 = 6; etc).

	Full Transportation		Transportation with	
McNary D	**Wild**	**Hatchery**	**Wild**	**Hatchery**
SR	7.13	2.43	35.46	3.66
UCR	51.29	97.57	35.64	96.34
MCR - Sur	41.59	---	28.90	---
MCR - Wir	---	---	---	---
LCR	---	---	---	---
UWR	---	---	---	---
John Day Dam				
SR	0.62	2.43	18.59	3.66
UCR	4.46	97.57	18.69	96.34
MCR - Sur	94.92	---	62.73	---
MCR - Wir	---	---	---	---
LCR	---	---	---	---
UWR	---	---	---	---
The Dalles Dam				
SR	0.48	2.43	16.15	3.66
UCR	3.46	97.57	16.24	96.34
MCR - Sur	96.06	---	67.62	---
MCR - Wir	---	---	---	---
LCR	---	---	---	---
UWR	---	---	---	---
Bonneville Dam				
SR	0.38	2.43	13.94	3.66
UCR	2.72	97.57	14.02	96.34
MCR - Sur	75.59	---	58.38	---
MCR - Wir	5.55	---	3.55	---
LCR	15.77	---	10.10	---
UWR	---	---	---	---
Tongue Point				
SR	54.38	7.71	52.83	8.28
UCR	5.36	92.29	4.69	91.72
MCR - Sur	15.33	---	15.63	---
MCR - Wir	0.83	---	0.89	---
LCR	13.23	---	14.24	---
UWR	10.87	---	11.70	---

SR = Snake River ESU
UCR = Upper Columbia River ESU
MCR - Summer = Mid Columbia River ESU summer steelhead
MCR - Winter = Mid Columbia River ESU winter steelhead
LCR = Lower Columbia River ESU
UWR = Upper Willamette River ESU

Table 10. Juvenile steelhead trout collection at each of the mainstem collection facilities in 2005 under full transportation and transportation with spill scenarios. Percentage of listed fish by rearing type (wild or hatchery) at each facility.

****Use this table only if the reartype of all handled fish is known****

	Full Transportation Scenario		Transportation with Spill Scenario	
	Wild steelhead trout	Listed hatchery steelhead trout	Wild steelhead trout	Listed hatchery steelhead trout
Total fish collected at:*				
Snake River				
Lower Granite	866,327	5,559,086	507,884	3,259,014
Little Goose	178,581	1,142,651	269,139	1,725,920
Lower Monumental	30,161	239,133	117,632	785,085
Ice Harbor**	12,910	103,773	92,383	619,347
Columbia River				
Wells***	111,730	486,482	111,730	486,482
Rocky Reach***	133,327	554,318	133,327	554,318
Rock Island***	152,875	793,744	152,875	793,744
Wanapum***	137,588	714,370	137,588	714,370
Priest Rapids***	123,829	642,933	123,829	642,933
McNary****	195,577	963,823	61,284	331,024
John Day** ****	173,370	175,968	119,498	362,174
The Dalles** ****	144,032	193,122	237,044	699,689
Bonneville (I & II combined)** *****	177,589	285,681	113,752	332,048
---To the tailrace of Bonneville	322,889	519,420	490,310	1,431,241
---To Tongue Point******	2,086,803	11,629,628	1,945,258	10,763,243
Total listed fish at:				
Snake River				
Lower Granite	866,327	0	507,884	0
Little Goose	178,581	0	269,139	0
Lower Monumental	30,161	0	117,632	0
Ice Harbor**	12,910	0	92,383	0
Columbia River				
Wells***	111,730	486,482	111,730	486,482
Rocky Reach***	133,327	544,668	133,327	544,668
Rock Island***	152,875	785,059	152,875	785,059
Wanapum***	137,588	706,553	137,588	706,553
Priest Rapids***	123,829	635,898	123,829	635,898
McNary****	195,577	615,334	61,285	134,006
John Day** ****	173,370	43,073	119,499	130,114
The Dalles** ****	144,032	27,690	237,046	222,629
Bonneville (I & II combined)** *****	177,589	27,413	113,753	92,970
---To the tailrace of Bonneville	322,889	49,842	490,315	400,733
---To Tongue Point******	2,018,331	665,176	1,876,792	534,739
Percent listed fish at:				
Snake River				
Lower Granite	100.00%	0.00%	100.00%	0.00%
Little Goose	100.00%	0.00%	100.00%	0.00%
Lower Monumental	100.00%	0.00%	100.00%	0.00%
Ice Harbor**	100.00%	0.00%	100.00%	0.00%
Columbia River				
Wells***	100.00%	100.00%	100.00%	100.00%
Rocky Reach***	100.00%	98.26%	100.00%	98.26%
Rock Island***	100.00%	98.91%	100.00%	98.91%
Wanapum***	100.00%	98.91%	100.00%	98.91%
Priest Rapids***	100.00%	98.91%	100.00%	98.91%
McNary****	100.00%	63.84%	100.00%	40.48%
John Day** ****	100.00%	24.48%	100.00%	35.93%
The Dalles** ****	100.00%	14.34%	100.00%	31.82%
Bonneville (I & II combined)** *****	100.00%	9.60%	100.00%	28.00%
---To the tailrace of Bonneville	100.00%	9.60%	100.00%	28.00%
---To Tongue Point****	96.72%	5.72%	96.48%	4.97%

* Note: "Total fish collected at:" is the total number of fish collected of that species, run and rearing type.

** Note: These dams have no transportation facilities, therefore, no fish are removed from the river at these dams.

*** Note: The numbers shown for these dams represent the number of fish arriving at the dam, not the number collected; FGE's at these dams are not currently established. Also, there is no transportation from these dams.

**** Note: (See next page)

**** Note:	The percentage of listed wild fish from each ESU at each Columbia River dam from McNary Dam to Bonneville Dam and at Tongue Point. All listed hatchery fish are from the Upper Columbia River ESU.				
	For example, If you handle 1,000 steelhead at Tongue Point, under the Full Transportation with spill scenario (above), 96.48% of them will be listed wild fish, or 965 fish. To these 965 fish, apply the percentages listed below under the Tongue Point section to determine how many are from each ESU (SR, 965 x 0.5283 = 510; UCR, 965 x 0.0469 = 45; etc).				
		Full Transportation		**Full Transportation with spill**	
	McNary Dam	**Wild**	**Hatchery**	**Wild**	**Hatchery**
	SR	7.13	2.43	35.46	3.66
	UCR	51.29	97.57	35.64	96.34
	MCR - Summer	41.59	---	28.90	---
	MCR - Winter	---	---	---	---
	LCR	---	---	---	---
	UWR	---	---	---	---
	John Day Dam				
	SR	0.62	2.43	18.59	3.66
	UCR	4.46	97.57	18.69	96.34
	MCR - Summer	94.92	---	62.73	---
	MCR - Winter	---	---	---	---
	LCR	---	---	---	---
	UWR	---	---	---	---
	The Dalles Dam				
	SR	0.48	2.43	16.15	3.66
	UCR	3.46	97.57	16.24	96.34
	MCR - Summer	96.06	---	67.62	---
	MCR - Winter	0.00	---	0.00	---
	LCR	---	---	---	---
	UWR	---	---	---	---
	Bonneville Dam				
	SR	0.38	2.43	13.94	3.66
	UCR	2.72	97.57	14.02	96.34
	MCR - Summer	75.59	---	58.38	---
	MCR - Winter	5.55	---	3.55	---
	LCR	15.77	---	10.10	---
	UWR	---	---	---	---
	Tongue Point				
	SR	54.38	7.71	52.83	8.28
	UCR	5.36	92.29	4.69	91.72
	MCR - Summer	15.33	---	15.63	---
	MCR - Winter	0.83	---	0.89	---
	LCR	13.23	---	14.24	---
	UWR	10.87	---	11.70	---
	SR = Snake River ESU				
	UCR = Upper Columbia River ESU				
	MCR - Summer = Mid Columbia River ESU summer steelhead				
	MCR - Winter = Mid Columbia River ESU winter steelhead				
	LCR = Lower Columbia River ESU				
	UWR = Upper Willamette River ESU				

Table 11. Estimated number of listed fish outmigrating from each ESU, 2005.

ESU	Run	Number of listed fish		
			Hatchery[e]	
		Wild	AD-clipped	Non-AD-clipped
Snake River				
Chinook	Spring/summer	2,813,811	3,131,390	545,586
	Fall	595,392	1,994,185	2,170,103
Steelhead	Summer	1,107,909	0	0
Sockeye		5,567	21,517	0
Upper Columbia				
Chinook	Spring	800,850	357,518	704,424
Steelhead	Summer	177,381	990,000	0
Mid-Columbia				
Steelhead	Summer	383,644	0	0
	Winter	16,557	0	0
Lower Columbia				
Chinook	Spring	1,152,358	2,257,555	150,000
	Fall (tule)	8,572,269	15,500,988	25,115,175
	Fall (late run)	4,009,111	0	0
Steelhead	Summer/Winter	263,832	0	0
Coho		1,205,154	17,233,500	7,400
Upper Willamette				
Chinook	Spring	3,847,700	3,681,164	0
Steelhead	Winter	216,784	0	0
Columbia River				
Chum		No estimate	0	450,000

a Listed hatchery numbers are release numbers.

Appendix A.

Determination of the effects of returning all PIT-tagged spring/summer Chinook salmon to the river at each collection dam on the number of fish that arrive at each subsequent dam

We surveyed researchers regarding the number of outmigrating PIT-tagged spring/summer Chinook salmon in the Snake River we could expect in 2005. We found that 227,000 hatchery fish will be PIT tagged and released above Lower Granite Dam as part of the Comparative Survival Study (CSS). We applied the hatchery survival estimates found in Table 1 to the fish released from hatcheries to determine the number of CSS hatchery fish that will arrive at Lower Granite Dam (145,489). The CSS requires that 70% of the fish collected at each of the Snake River collector dams be transported.

Another 27,139 hatchery spring/summer Chinook salmon (PIT tagged at hatcheries (not part of the CSS) and traps) will arrive at Lower Granite Dam. Of the 172,628 (145,489 + 27,139) hatchery fish reaching Lower Granite Dam, 42,643 will be listed hatchery fish.

Because tagging for the 2005 outmigration year began in July 2004 and continues throughout the outmigration year, we cannot accurately estimate survival from tagging of natural and inriver fish to the head of the Lower Granite Reservoir. We assumed that all of these fish would survive to the head of the reservoir, realizing that this is an overestimation. We chose the head of the reservoir because that is where the last of the tagging occurs, and because we have survival estimates from the head of the reservoir to the tailrace of Lower Granite Dam. It is expected that 66,606 wild spring/summer Chinook salmon will be PIT tagged above Lower Granite Dam. Using 90% survival from tagging location through the Lower Granite Dam pool, 59,945 (66,606 x 0.90) will arrive at Lower Granite Dam.

National Marine Fisheries Service will be PIT-tagging fish at Lower Granite Dam during the 2005 outmigration. As part of this marking, 10,000 PIT-tagged wild and 239,598 PIT-tagged hatchery spring/summer Chinook salmon will be released into the Lower Granite Dam tailrace. As these fish move downstream, all of those collected at Little Goose and Lower Monumental Dams will be diverted back to the river.

Approximately 4,400 fish (400 wild and 4,000 hatchery) will be released in the Tucannon River. These fish are assumed to arrive at Lower Monumental Dam with no mortality.

We performed two calculations to determine the expected number of PIT-tagged fish collected at each collector dam. The first calculation made use of the same formulas used under the "Transportation with Spill" and "Full Transportation" scenarios which assume that every fish collected is transported (except the CSS fish). This calculation provided the number of fish collected at each dam if no PIT-tagged fish were returned to the river. In other words, this calculation is based solely on the number of fish that are not collected and transported at upstream dam(s).

In the second calculation we assumed that the only fish transported at each Snake River collector dam are the CSS fish. This calculation provided the number of fish collected at each dam if the remaining PIT-tagged fish were returned to the river. This calculation includes both the fish that were returned to the river at upstream dam(s) and the fish that were not collected at upstream dam(s). Because the number derived from the second calculation includes the number from the first calculation, the difference between the numbers from these two calculations is the number of PIT-tagged fish that were collected at each dam that were not accounted for because they were returned to the river at each dam (the number for each dam was added to the appropriate "... fish collected ..." columns in Tables 7-8). This difference in the number of fish collected was then expanded to the number of fish that arrived at the dam by dividing by the FGE of that dam, and was added to the number of fish that arrived at McNary Dam because they had not been collected and transported at upstream dams under both the "Transportation with Spill" and "Full Transportation" scenarios (column "Listed fish to McNary" in Tables 2 and 3, respectively).

Calculation 1 (Transportation)

Transportation with Spill Scenario--The numbers presented below assume that 58.2% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 41.8%), and that 30% of the CSS fish are returned to the river. In addition, 10,000 wild and 239,598 hatchery fish will be released into the tailrace of Lower Granite Dam from marking at the dam.

Using the FGEs in Table 2, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2005 will be

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	18,503	29,158	106,896	154,557
Lower Monumental	7,118	12,410	40,303	59,831
McNary	4,040	7,044	22,876	33,960

Full Transportation Scenario--The numbers presented below assume that 40.0% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 60.0%), and that 30% of the CSS fish are returned to the river. In addition, 10,000 wild and 239,598 hatchery fish will be released into the tailrace of Lower Granite Dam from marking at the dam.

Using the FGEs in Table 3, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2005 will be

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	19,877	36,842	137,868	194,587
Lower Monumental	5,016	10,927	33,406	49,349
McNary	3,251	7,081	21,647	31,979

Calculation 2 (Only CSS fish transported)

This calculation assumes that all collected PIT-tagged fish (except the CSS fish) are returned to the river at each Snake River collector dam.

For the PIT-tagged fish returned to the river at each collection dam, the only loss of fish as they migrate downstream is the mortality through each reservoir and dam. Based on the NMFS survival studies, survival through each reservoir and dam was estimated to be 90%. The estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2005 will be

Transportation with Spill Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	28,831	33,290	114,959	177,080
Lower Monumental	20,197	22,840	72,241	115,278
McNary	17,746	19,268	59,908	96,922

Full Transportation Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Little Goose	40,918	45,261	154,293	240,472
Lower Monumental	28,528	30,487	94,117	153,132
McNary	36,972	37,963	115,074	190,009

Subtracting collection numbers estimated by Calculation 1 from Calculation 2 provides the number of unaccounted for PIT-tagged fish that were collected at each dam (Appendix Table A1).

Appendix Table A1. Estimates of the number of unaccounted for PIT-tagged spring/summer Chinook salmon that will be collected at each of the collection dams, and estimates of how many of these fish will arrive at McNary Dam, 2005.

Transportation with Spill Scenario

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:				
Little Goose	10,328	4,132	8,063	22,523
Lower Monumental	13,079	10,430	31,938	55,447
McNary	13,706	12,224	37,032	62,962
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.384):				
McNary	35,693	31,833	96,438	163,964

Full Transportation Scenario (No Spill)

Dam	Wild	Listed hatchery	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:				
Little Goose	21,041	8,419	16,425	45,885
Lower Monumental	23,512	19,560	60,711	103,783
McNary	33,721	30,882	93,427	158,030
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.80):				
McNary	42,151	38,603	116,784	197,538

Appendix B.

Determination of the effects of returning all PIT-tagged steelhead to the river at each collection dam on the number of fish that arrive at each subsequent dam

We surveyed researchers regarding the number of outmigrating PIT-tagged steelhead in the Snake River we could expect in 2005. We found that 17,050 hatchery fish will be PIT tagged prior to release above Lower Granite Dam. Based on the survival rates of the various hatcheries releasing fish, we estimate that 13,401 will arrive at Lower Granite Dam. Another 12,735 hatchery steelhead (PIT tagged at traps) will arrive at Lower Granite Dam, bringing the total to 26,136 hatchery fish arriving at Lower Granite Dam. In addition, 4,860 wild steelhead PIT tagged at traps will arrive at Lower Granite Dam.

National Marine Fisheries Service will be PIT-tagging steelhead at Lower Granite Dam during the 2005 outmigration. As part of this marking, 30,000 PIT-tagged fish will be released into the Lower Granite Dam tailrace. Of these, approximately 10,000 will be wild fish and 20,000 will be hatchery fish. All of the fish collected at Little Goose and Lower Monumental Dams will be diverted back to the river.

We performed two calculations to determine the expected number of PIT-tagged fish collected at each collector dam. The first calculation made use of the same formulas used under the "Transportation with Spill" and "Full Transportation" scenarios which assume that every fish collected is transported. This calculation provided the number of fish collected at each dam if no PIT-tagged fish were returned to the river. In other words, this calculation is based solely on the number of fish that are not collected and transported at upstream dam(s).

In the second calculation we assumed that no fish are transported. This calculation provided the number of fish collected at each dam if all PIT-tagged fish were returned to the river. This calculation includes both the fish that were returned to the river at upstream dam(s) and the fish that were not collected at upstream dam(s). Because the number derived from the second calculation includes the number from the first calculation, the difference between the numbers from these two calculations is the number of PIT-tagged fish that were collected at each dam that were not accounted for because they were returned to the river at each dam (the number for each dam was added to the appropriate "... fish collected ..." columns in Tables 9-10). This difference in the number of fish collected was then expanded to the number of fish that arrived at the dam by dividing by the FGE of that dam, and was added to the number of fish that arrived at McNary Dam because they had not been collected and transported at upstream dams under both the “Transportation with Spill” and “Full Transportation” scenarios (column "Listed fish to McNary" in Tables 5 and 6, respectively).

Calculation 1 (Transportation)

Transportation with Spill Scenario--Assuming that 53.1% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 46.9%), 2,581 (4,860 x 0.531) wild and 13,878 (26,136 x 0.531) unlisted hatchery fish will reach the Lower Granite Dam tailrace. In addition, 10,000 wild and 20,000 unlisted hatchery fish will be released into the tailrace from marking at the dam. Therefore, the total numbers of PIT-tagged fish in the Lower Granite Dam tailrace will be 12,581 (2,581 + 10,000) wild and 33,878 (13,878 + 20,000) unlisted hatchery fish.

Using the FGEs in Table 5, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2005 will be

Dam	Wild	Unlisted hatchery	Total
Little Goose	5,865	15,794	21,659
Lower Monumental	2,522	6,653	9,175
McNary	459	1,348	1,807

Full Transportation Scenario--Assuming that 20.0% of the PIT-tagged fish arriving at Lower Granite Dam will not be collected (FGE = 80.0%), 972 (4,860 x 0.20) wild and 5,227 (26,136 x 0.20) unlisted hatchery fish will reach the Lower Granite Dam tailrace. In addition, 10,000 wild and 20,000 unlisted hatchery fish will be released into the tailrace from marking at the dam. Therefore, the total numbers of PIT-tagged fish in the Lower Granite Dam tailrace will be 10,972 (972 + 10,000) wild and 25,227 (5,227 + 20,000) unlisted hatchery fish.

Using the FGEs in Table 6, the estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2005 will be

Dam	Wild	Unlisted hatchery	Total
Little Goose	8,887	20,434	29,321
Lower Monumental	903	2,011	2,914
McNary	354	1,419	1,773

Calculation 2 (No Transportation)

Assuming that 100% of the collected PIT-tagged fish are returned to the river at Lower Granite Dam, 14,860 (4,860 + 10,000) wild and 46,136 (26,136 + 20,000) unlisted hatchery fish will reach the tailrace.

Because 100% of the PIT-tagged fish were assumed to be returned to the river at each collection dam, the only loss of fish as they migrate downstream is the mortality through each reservoir and dam. Based on the NMFS survival studies, survival through each reservoir and dam was estimated to be 90%. The estimated number of PIT-tagged fish collected at each dam below Lower Granite Dam in 2005 will be

Transportation with Spill Scenario

Dam	Wild	Unlisted hatchery	Total
Little Goose	6,928	21,509	28,437
Lower Monumental	3,887	17,904	21,791
McNary	1,035	6,100	7,135

Full Transportation Scenario

Dam	Wild	Unlisted hatchery	Total
Little Goose	12,037	37,370	49,407
Lower Monumental	3,411	24,973	28,384
McNary	3,442	28,639	32,081

Subtracting collection numbers estimated by Calculation 1 from Calculation 2 provides the number of unaccounted for PIT-tagged fish that were collected at each dam (Appendix Table B1).

Appendix Table B1. Estimates of the number of unaccounted for PIT-tagged steelhead that will be collected at each of the collection dams, and estimates of how many of these fish will arrive at McNary Dam, 2005.

Transportation with Spill Scenario

Dam	Wild	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:			
Little Goose	1,063	5,715	6,778
Lower Monumental	1,365	11,251	12,616
McNary	576	4,752	5,328
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.196):			
McNary	2,941	24,243	27,184

Full Transportation Scenario (No Spill)

Dam	Wild	Unlisted hatchery	Total
Number of unaccounted for PIT-tagged fish collected:			
Little Goose	3,150	16,936	20,086
Lower Monumental	2,508	22,962	25,470
McNary	3,088	27,220	30,308
Number of unaccounted for PIT-tagged fish that arrived at McNary Dam (FGE = 0.90):			
McNary	3,431	30,244	33,675